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The King George the Fifth Silver Jubilee Cancer Fund for Canada

IN order to give the people of Canada an opportunity of permanently commemorating the 25th Anniversary of the King's accession to the Throne, as an act of thanksgiving, His Excellency the Governor-General will shortly inaugurate a Silver Jubilee Fund in the Dominion. The King has graciously consented to His Excellency's request that His Majesty's name should be directly associated with this Fund.

The object towards which the proceeds shall be devoted has for some time been the subject of close consideration. It is understood that it has recently been decided that the purpose shall be the Relief of Cancer, the terrible disease which is annually claiming such an increasing number of our people that it is of paramount importance that a national effort should be made to check its dire progress. There has never previously been an appeal in Canada for the relief of cancer, nor is there any lay national voluntary association in the country having for its sole object the relief of this disease. The Fund to be inaugurated by His Excellency will accordingly be known as "The King George V. Silver Jubilee Cancer Fund for Canada." His Excellency will shortly make an announcement over the radio, inviting contributions and giving details of the scope and purpose of the Fund. Her Excellency the Countess of Bessborough is deeply interested in this project, and has agreed to receive and acknowledge all contributions made to it. The Fund, when completed, will be handed over by a Deed of Gift from Her Excellency to a Board of Trustees set up for the purpose to administer the Fund.

From J. S. McEACHERN, M.D., F.R.C.S.(C.),

President, Canadian Medical Association.

The announcement of the launching of the "King George V. Silver Jubilee Cancer Fund for Canada" must bring a feeling of joy and satisfaction to every member of the Canadian Medical Association. We, as Canadian citizens, should be proud to have the opportunity to give tangible expression to our admiration for, and loyalty to, the man who for twenty-five years has been the ruler and the steadfast friend of his people.

The application of scientific knowledge to the problem of cancer is, and must ever remain, the responsibility of the medical profession. The establishment of this fund provides an opportunity for the Canadian citizens in every walk of life to help in the control of this dread scourge. It constitutes a challenge to the medical profession of Canada to mobilize every agency at its disposal to carry on the fight to a successful conclusion.

The Canadian Medical Association has authorized the establishment of a department of cancer control under its administration. The purpose and the scope of activities of this department are already familiar to the members of the Association. Its work can be made effective only by the voluntary expenditure of time and effort by a large number of doctors. But it requires, in addition, a very substantial annual expenditure of money. This has not been available until the present. It is our hope that this fund will provide the necessary financial aid to enable it to carry out its program.

The thanks of the Association, and indeed of all the people of Canada, are due to the Earl of Bessborough, whose leadership makes possible this magnificent tribute to our beloved Sovereign.

From A. PRIMROSE, C.B., M.B., C.M., F.R.C.S., LL.D.,

Chairman, Cancer Committee, Canadian Medical Association

The announcement of His Excellency, our Governor-General, that he will inaugurate a Fund for the Control of Cancer in Canada will be heartily welcomed by all Canadians. The medical profession, in particular, recognizes the pressing need for the expenditure of large sums of money in this country if the victims of cancer are to have made available to them all the benefits that may be derived from modern achievement in the control of this dire disease. The dissemination of knowledge among the profession by expert specialists, more particularly regarding the diagnosis and treatment of cancer, is a crying need at the moment. Groups of properly qualified persons should travel through this wide Dominion, from coast to coast, and by demonstration and lecture the medical practitioners would be kept informed and instructed by them regarding the ever-advancing forefront of knowledge resulting from clinical and laboratory research and experience.

Of equal importance is provision for the instruction of the laity. The fact that if the treatment of cancer is undertaken sufficiently early in its course a cure will result must be stressed. The public require to be constantly reminded of their responsibility to consult a properly qualified medical practitioner in the earliest manifestations of the disease.

As Chairman of the Study Committee on Cancer of the Canadian Medical Association I am greatly impressed with the possibilities that open up and the prospect of future effective action in the creation of such a Fund.

My Committee studied the situation in great detail, but were frustrated in their effort to realize essential ideals because of the lack of funds. Among other things it has been suggested that Bursaries or Scholarships should be available for those specializing in various centres (more particularly in the use of radium and x-rays), so that they might travel abroad and learn at first-hand the intricacies of modern technique. Thus their efficiency as therapeutists would be greatly enhanced.

Finally, may I stress with all the emphasis I can command that members of our profession throughout the country should contribute to this Fund. It is realized that in many instances the contribution must of necessity be small, but I am confident that all members of our profession would like to have an individual part in this tribute to our Most Gracious Sovereign in the Silver Jubilee Year of his accession to the Throne. We are most grateful to His Excellency the Governor-General for initiating a movement that will have such far-reaching effect in mitigating pain and suffering among the sick folk of Canada.

From A. G. NICHOLLS, M.D., D.Sc., F.R.S.C.,

Editor, Canadian Medical Association Journal

This is a trumpet call to action. From a medical, economic and humanitarian point of view the Control of Cancer is, probably, the most important matter that is occupying our attention at the present time. Indeed, it is so important and so large that to deal with it adequately we shall need the active cooperation of all classes of our people—lay as well as medical. The Canadian Medical Association has not been unmindful of its responsibility and for several years past a special Cancer Committee has been at work, which has arrived at some valuable conclusions. Next month we shall publish a report from this Committee. The *Journal* also has been featuring a series of articles, intended primarily for medical men, which have dealt with that *sine qua non*—early diagnosis. The subject of cancer control is timely, if, indeed, not over-due so far as Canada is concerned, and we rejoice that it is to be brought to the attention of the whole community in so effective a way.

INCLUSION BLENNORRHŒA*

By S. Hanford McKee,

Montreal

INCLUSION blennorrhœa is a conjunctivitis of the new-born, somewhat similar to gonorrhœal ophthalmia neonatorum, but differing from it in etiology, severity and clinical course. This new clinical entity is called "inclusion blennorrhœa" because of the inclusions found in the cytoplasm of the epithelial cells. Some years ago now, Halberstaedter and v. Prowazek,[1] while working on syphilis in Java, examined a number of trachoma cases. In the epithelial cells of the conjunctiva they constantly found inclusions. In preparations stained with Giemsa these inclusions were found inside the light blue stained protoplasm as dark blue non-homogeneous irregular bodies that were usually adjacent to the pink nucleus. The embedded bodies, usually small and rounded, gradually became larger, assumed a mulberry form, and, with increasing growth, underwent a progressive dispersion which began at the centre. Subsequently they usually formed a cap over the nucleus.

It was the belief of Halberstaedter and v. Prowazek that the small reddish stained granules were the active virus of the disease. They were designated by them as "elementary bodies". This finding was soon confirmed by many observers, but it was not long before evidence appeared casting doubt on their specificity. In a number of cases of ophthalmia of the new-born similar bodies were found, and in some of these a definite bacteriological cause had been established. One of the early reports came from this hospital, where inclusions had been found in three infants with ophthalmia neonatorum. This demonstrated that the trachoma inclusions were by no means pathognomonic of trachoma.

Heyman,[2] in 4 cases, clinically and culturally gonorrhœal ophthalmia of the new-born, found similar small bodies in great numbers. He discussed the question of whether under the influence or irritation of the gonorrhœal virus identical formations could not be generated. He also reported the finding of inclusions in the urethra and cervical mucosa respectively of the parents of children with ophthalmia. Numerous other investigators have reported the finding of these bodies in the urethra. In innumerable examinations made here in urethritis cases in all stages we have never found inclusions in the urethra. Axenfeld, after a careful review of all the evidence up to that time, concluded in 1912 that the inclusions represented a living parasite.

Lindner,[3] of Vienna, believed that in conjunctivitis where both gonococci and inclusions were present one was dealing with a mixed infection with gonococci and a hypothetical inclusion virus, which, when present alone, caused inclusion blennorrhœa. He later advanced the theory that the viruses of trachoma and inclusion blennorrhœa were originally identical, but the former by repeated passage from one conjunctiva to the other acquired the property of producing trachoma, while the latter lived in the genital tract and produced, when transferred to the conjunctiva of the new-born, "inclusion blennorrhœa". A "new disease" has thus been suggested. It is a fairly benign form of conjunctivitis, generally of the new-born (but of the adult as well), which begins about the fifth day after birth. That it is widely disseminated is indicated by reports from many countries. Hootth reports that in Hungary there is one case of inclusion blennorrhœa in every five hundred eye cases. The acute stage of the disease lasts about two weeks, followed by a chronic one of some months' duration. The prognosis is good.

During the last two years we have studied a series of 27 cases of ophthalmia of the new-born through their entire stay in hospital. Our efforts have been directed chiefly to seeking a

* Presented at the Clinico-Pathological Conference, Montreal General Hospital, October, 1934.

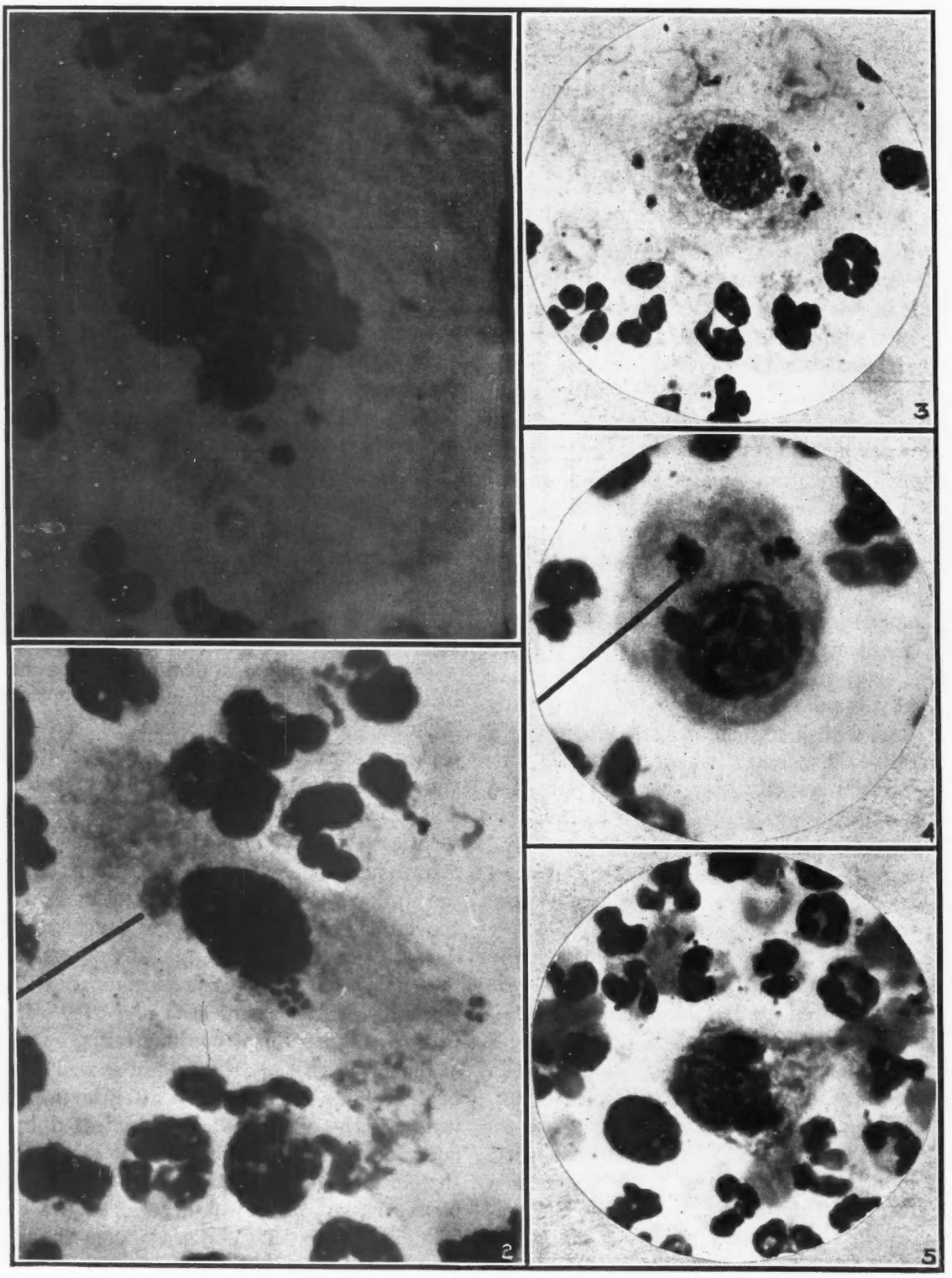

FIG. 1.—An epithelial cell with many inclusion bodies. A typical picture in inclusion blennorrhœa.

FIG. 2.—Epithelial cell with gonococci and an inclusion which shows diplococci partly disintegrated.

FIG. 3.—Initial bodies? Grouped gonococci, very similar to initial bodies.

FIG. 4.—Epithelial cell with clusters of gonococci, with some suggestion of a stage where small cocci form before these break up into the granules composing the inclusion body.

FIG. 5.—Further grouping of gonococci, giving an appearance similar to inclusion bodies.

solution of the meaning of the cell inclusions. These are found in acute trachoma, in swimming-bath conjunctivitis, and in blennorrhœa. Some years ago Wolbach and I, after a study of the inclusions of trachoma, stated that we did not believe that they were specific for trachoma, but that they were the product of mucous secretion under pathological conditions. Since that time numerous hypotheses have been brought forward. Some investigators maintain that the inclusions are living organisms; others seem equally sure that they are not bacterial at all. Ida Bengtson[4] concludes the report of an experimental study as follows. "It has been possible to produce experimentally forms corresponding in appearance to the elementary bodies of Prowazek and the initial bodies of Lindner by inoculating into the conjunctiva of guinea-pigs Gram-negative bacilli".

Gifford and Lazar[5] produced a conjunctivitis in animals with two chemical agents and an organism obtained from a source independent of trachoma and inclusion blennorrhœa. Gifford believed numbers of the inclusions found were typical. Stewart,[6] working at Giza, Egypt, concluded that the inclusions were due to persisting bacterial infection. He believes the picture obtained in the epithelial film leaves no doubt but that the inclusions found in trachoma are formed of pathogenic bacteria by the epithelial cells. He states that the transmission from bacteria to a complete inclusion can be traced, and that inclusions do not occur except in the cases where bacterial infection is present. The apparent occurrence of pure cases of inclusion blennorrhœa without bacteria he believes is due to the admitted difficulties of proving the presence of bacteria in many cases.

Thygeson,[7] at the last meeting of the Society for Research in Ophthalmology, reported that he had set up inclusion blennorrhœa by inoculating a conjunctiva with a filterable virus obtained from the inclusions. He believes the etiological agent of the disease is a filterable virus having an elementary body phase and an initial body phase. Filterability is dependent upon the elementary body phase. Inclusion blennorrhœa and swimming-bath conjunctivitis are caused by the same virus, the clinical differences in the two diseases being due to the difference in the reactivity of the conjunctivæ of the new-born and the adult.

During the observation of a series of ophthalmia cases in infants, in some of which inclusions alone were found, but in the majority of which inclusions and bacteria were both present, an attempt was made to solve the meaning of the inclusions. During this study, a large number of urethral slides were also examined. In approaching this question it seemed to me we should begin with the facts known of the action of the conjunctival epithelial cells on conjunctival bacteria. In 1912 it was suggested by the writer[8] that the use of the epithelial cell smear would explain many cases of conjunctival infection where by other methods the findings were negative. It has been shown that microorganisms in the conjunctiva may be free, they may lie as parasites on the epithelial cells, or they may be found in the mucosa. Pathogenic bacteria come in touch with the epithelial cells in the first instance by growing freely on their surface. When the opsonic level reaches a certain height the epithelial cells engulf the bacteria and destroy them. This process of phagocytosis by the epithelial cells is well seen in the ophthalmias of the new-born. Digestion of bacteria takes place, and as the latter lose their outline they are seen as blue-stained bodies of various shapes and sizes according to the number of microörganisms involved. With a few bacteria one finds bodies about one to two microns in diameter of the size of cocci. If a large number of bacteria have been growing on the cell they naturally give rise to a larger mass. Digestion of the bacteria continues, ending with the large blue-stained bodies called "chlamydozoa", because they so often set like a mantle over the pink nucleus. It is to be borne in mind that parts of broken-down cells, nuclei, nucleoli, and inorganic particles are also often found within the cell protoplasm. In certain cells we have seen gonococci clusters, with the suggestion of a stage of coccus formation before they break up into granules. The cocci thus become disintegrated and form into the so-called mantle protozoa.

From the study of these cases, without having seen Stewart's report, we had come to practically the same conclusion, namely, that the cell inclusions, which are found in trachoma,

inclusion blennorrhœa, and swimming-bath conjunctivitis, are not protozoa and the etiological factor in these diseases, but are the result of phagocytosis of microörganisms by the epithelial cells of the conjunctiva.

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DISLOCATION OF THE RADIO-CARPAL JOINT

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ONE of the curious examples of the persistence of an error in diagnosis is to be found in connection with injuries to the wrist. Until a century ago the very common deformity which comes from a fall on the outstretched hand—"Colles' fracture"—was ascribed not to a fracture but to a dislocation. The error dates back to ancient times. Hippocrates[1] describes four kinds of dislocation at the wrist but omits any reference to fractures in this region, although separation of the epiphysis is mentioned. His description of the dislocations, with remarks on the treatment and prognosis, is of interest:—

> "The whole hand is dislocated either inward [radius inward, *i.e.*, dorsal or posterior dislocation] or outward [anterior dislocation] or to this side or that, but more especially inward, and sometimes the epiphysis is displaced, and sometimes the other of these bones is separated. In these cases strong extension is to be applied and pressure is to be made on the projecting bone, and counter-pressure on the opposite side both at the same time, behind and at the side, with the hands upon a table or with the heel. These accidents give rise to serious consequences and deformities; but in the course of time the part gets strong, and admits of being used. The cure is with bandages which ought to embrace both the hand and forearm; and splints are to be applied as far as the fingers; and when they are used they should be more frequently unloosed than in fractures, and more copious affusions of water should be used."

Pouteau, chief surgeon of the Hôtel-Dieu in Lyons seems to have been the first to recognize and describe the injury as a fracture. He died in the eventful year of 1775, and in his posthumous works published in 1783[2] is to be found a description of the injury, emphasizing the presence of the fracture, its pathology, symptoms and treatment. He described the fracture as affecting both the radius and the ulna, but this should not detract from the credit due him in pointing out the current error.. Pouteau's effort gained no credence, and it was left to an Irishman to rediscover the truth. In 1814 a Dublin surgeon, Abraham Colles, published a paper[3] which has made his name remembered throughout the surgical world. The profession is indebted to the *British Journal of Surgery*[4] for publishing a complete transcript of the original article. This brief but accurate account of the injury is purely clinical, as Colles had no opportunity of confirming the findings by pathological examination. It is true that he describes the fracture as taking place at a higher level than we now know to be the rule, but the article is of such charm and excellence that it well deserves study in these days, even though it failed to make an impression at the time on any but his immediate associates. Succeeding years with their more exact aids to diagnosis have but served to emphasize the value of Colles' contribution, and, however much objection is raised to the use of eponyms, "Colles' fracture" seems to have a secure place in medical terminology.

Shortly after Colles, Dupuytren in France, using the knowledge gained by post-mortems,

took up the cudgels, and was largely responsible for the more general recognition of the injury as a fracture. As Stimson[5] says: "The great change which took place in the science of medicine at the beginning of the last century under the inspiration and guidance of the French physicians, the substitution of objective knowledge for dogma, of clinical and dead-house observation for pure speculation, made short work of this error. Dupuytren's campaign was not without its dramatic side, as narrated by Malgaigne.[6] While the controversy was at its height a patient with this and other injuries died at the Hôtel-Dieu. Dupuytren recognized it as a fracture. Pelletan, Marjolin and others maintained it was a dislocation. An autopsy was done, and it was not until Dupuytren's deft strokes had revealed the broken surfaces of the bone that they changed their front.

The following summing-up of Dupuytren's views is of interest when one remembers how great was his experience.[7]

> "I have for a long time publicly taught that fractures of the carpal end of the radius are extremely common; that I had always found these supposed dislocations of the wrist turn out to be fractures; and that, in spite of all which has been said upon the subject, I have never met with, or heard of, one single well-authenticated and convincing case of the dislocation in question".

Seeking to explain this rarity of dislocation he adds:

> "In examining the structure of the soft parts, one cannot fail to perceive that it is not the ligaments which prevent the displacement of the articular surface forwards, but that this effect is especially due to the multitude of flexor tendons, deprived as they are at this point of all the fleshy parts, and reduced to the simple fibrous tissue which composes them. These tendons are bound together beneath the anterior annular ligament of the wrist, and thus offer so efficient a resistance that severe falls are insufficient to tear them through: the hand is forced into a state of extreme extension, and the tendons are firmly applied on the anterior part of the radio-carpal articulation. If the extension is still further augmented, the wrist joint is yet more closely clasped by these parts, and their power of resistance is incalculable; I am convinced that a force equivalent to one thousand pounds weight would be inadequate to overcome it; and the known power of the tendo Achillis is sufficient to prove that this computation is not exaggerated. The risk of dislocation backwards by a fall on the dorsal surface of the hand is equally precluded by the tendons of the extensor muscles. Their arrangement and relations at the back of the joint are similar; it is true they are not quite so strong, but we must admit that their power of resistance is very considerable, when we take into consideration how they are inclosed in sheaths as they cross beneath the posterior annular ligament of the wrist. I have not alluded to the ulna, for it has really little or nothing to do with these movements, as it does not articulate directly with the hand. To sum up, then, the extreme rarity of dislocation forwards or backwards is owing to the obstacles opposed by the flexor or extensor tendons."

Since Dupuytren's time opinion as to the rarity of dislocation has persisted. Thus Hamilton,[8] writing in 1880, says: "The whole number of cases is to this day so inconsiderable as only to establish the value and accuracy of Dupuytren's opinion". He quotes a paper written in 1871 by Parker who collected 33 cases up to that time, accepting 7 as free from objection. Some of the number were rejected by Parker because complicated by fracture, a view with which Hamilton took issue, as have most subsequent writers. This attitude it summed up by him as follows:

> "The existence of a complication does not render the accident any the less a dislocation, although it may render the diagnosis more difficult, and modify somewhat the indications of treatment."

Hamilton refers to a very interesting account of a double dislocation given in Bransby Cooper's edition of Sir Astley Cooper's work on Fractures and Dislocations. The case was reported to him by Mr. Haydon, a London surgeon.

> A lad, aged about thirteen years, was thrown violently from a horse on the 11th of June, 1840, striking upon the palms of both hands and upon his forehead. The left carpus was found to be dislocated backwards, the radius lying in front and upon the scaphoides (*sic*) and trapezium. The right carpus was dislocated forwards, the radius and ulna projecting posteriorly, and the bones of the carpus forming an "irregular knotty tumour terminating abruptly" anteriorly.
>
> A very careful examination was made to determine what parts came in contact with the resisting force, but although the palms of both hands were extensively bruised there was not the slightest bruise on the back of either hand. Nor were the gentlemen present able to find any evidence whatever that the dislocation was accompanied with a fracture. "Moreover", says Mr. Haydon, "we were strengthened in our opinion that this was a case of dislocation unattended with any fracture, because the dislocations appeared so perfect; the tumours in each member so distinct; the reduction so complete; the strength of the parts after reduction so great; and lastly, by the very trifling pain felt after reduction, for within an hour after the patient could rotate the hand, and supinate it when pronated—this could not, we believe, have been done had there existed a fracture."

Stimson[9] has, in his text-book (1912), a very complete chapter on dislocations of the wrist, accepting as more or less well authenticated about 70 cases, the great majority of them being posterior. He points out that most of these cases were reported before the days of Roentgen and that some of the conclusions are open to question. This is true in the case of the so-called "Barton's fracture". In 1838 Rhea Barton[10] described a fracture of the posterior border of the articular lip of the radius, with backward displacement of the carpus. Stimson gives three apparently valid reasons against the use of the term "Barton's fracture", and would

include this type of case with the dislocations, the fracture being incidental. Cotton suggests that he was really dealing with a Colles' fracture, wrongly interpreted. Since Stimson's summary the list has been added to, but all the modern text-books continue to refer to the dislocation as a rare injury. It is perhaps unusual, therefore, to be able to report the following 7 cases from the records of the Montreal General Hospital during the past twelve years.

CASE 1

N.M.H., aged 23, a hospital nurse, met with a peculiar accident on January 25, 1923, when placing her hand in a dumb-waiter. The car started to rise unexpectedly. The rising shelf of the car forced her hand upward while her wrist was held back by the lintel or upper horizontal part of the door-frame. She was in fact lifted off her feet. The opposing forces must have been applied to a nicety, one below and one above the line of the radio-carpal joint, for a complete backward dislocation took place at this level.

The displacement was very marked and there was a considerable amount of swelling and ecchymosis about the forearm and hand. It was noted that the fingers were held in a more extended position and in greater fixity than is seen in the Colles' type of fracture. Unfortunately the x-ray taken immediately after the accident has disappeared, but the following is the report of Dr. W. A. Wilkins, roentgenologist to the Montreal General Hospital at that time:—

"January 25, 1933.—X-ray examination of the right wrist shows increase in the soft tissue shadows with dorsal projection. The carpus and hand is displaced backwards and slightly upwards from its articulation with the radius. Slight ulnar displacement is also present. A small fracture of the styloid process of the ulna is noted, without displacement. No fracture of the radius or carpal bones is evident".

Under gas and oxygen anæsthesia the fracture was easily reduced some three hours after the injury. The displaced wrist slipped back with no crepitus but with a distinct click. A check-up skiagram showed the reposition to be complete. A light plaster splint was applied with the wrist in slight dorsi-flexion and retained for about ten days. Following the removal of the splint a course of physiotherapy, bakings and massage, was given but the swelling persisted for several months, with considerable limitation of movement. The swelling eventually disappeared and full function returned. She is still carrying on with her nursing duties and reports that her accident is but a memory.

CASE 2

Mrs. H.J.S., housewife, aged 43, on June 25, 1926, when riding in an automobile, rested her left arm on the ledge of an open window; the fingers were outside the front edge of the opening and the thumb inside. The automobile collided, throwing her forward. The palm of her hand was forced against the upright injuring her wrist.

On admission to the Montreal General Hospital her left wrist was obviously swollen. There was evidence of a silver-fork deformity in the wrist, but the prominence on the dorsum of the wrist was below that seen in the typical Colles' fracture (Fig. 1). The relative position of the styloid processes was unchanged. A diagnosis was made of posterior dislocation of the radio-carpal joint, and this was confirmed by the x-ray (Figs. 2 and 3). There were a small fragment torn away from the posterior lip of the radius, a fracture through the radial styloid, with almost no displacement, and a fracture of the ulnar styloid. Notwithstanding the fractures the essential lesion was a dislocation. Reduction was easily accomplished a few hours after the injury. She regained the full use of her hand.

I presented this patient when the American College of Surgeons met in Montreal in October of that year. Kellogg Speed was keenly interested in the skiagrams, and, if I remember correctly, said it was the first dislocation of the kind he had seen.

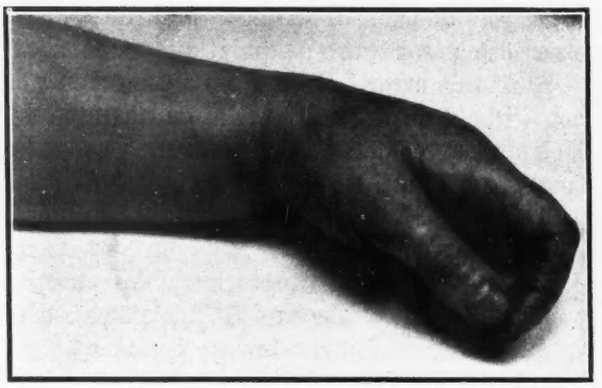

FIG. 1 *(Case 2)*.—Posterior dislocation of radio-carpal joint.

CASE 3

I have no data on this case except that the patient was a young man, aged 24, who, on November 4, 1926, was referred to the x-ray department of the Montreal General Hospital by one of my associates on behalf of an insurance company. The plates (Figs. 4 and 5) are very similar to those of Case 2 (Figs. 2 and 3), except that the radial styloid fracture extends farther into the joint, the chip off the posterior lip of the radius is almost negligible, and the ulnar styloid is intact. In spite of the presence of bone injury, it, too, is essentially a dislocation, as is apparent from the lateral skiagram.

CASE 4

R.C., male aged 25, a motor police officer, sustained an injury to his left wrist on December 11, 1932, when his motor-cycle collided with an automobile. He was violently thrown forward over the handle bars, but the force apparently drove his left hand against the bar with his wrist dorsi-flexed, producing a form of violence similar to that in Case 2.

He was admitted to the Montreal General Hospital, in Dr. A. T. Bazin's service, shortly after the accident. The left wrist presented an appearance corresponding to those described above. X-ray (Figs. 6 and 7) revealed a backward dislocation of the carpus, with a small fragment detached from the posterior articular lip of the radius, and linear fractures without displacement of the radial and ulnar styloids. The dislocation was reduced within a couple of hours of the injury by Dr. Archibald Stewart. No anæsthetic was required. A light plaster case was applied.

CASE 5

S.S., male, aged 40. This patient, a foreman in the railway yards, met with an injury on November 2, 1932, when standing on the top of a box-car. A cable under considerable tension slipped and knocked him to the ground. He had a fracture of the left leg and a posterior dislocation of the radio-carpal joint. The diagnosis was made on the characteristic deformity, which was most marked. The skiagrams (Figs. 8 and 9) showed some tearing away of the posterior margin on the radius and over-riding of the carpus on the radius.

Some four hours after the injury reduction was attempted. This was obtained without difficulty (Figs. 10 and 11). A light plaster cast was applied and retained for ten days; following this, active movements were encouraged. By the end of three months he had made a complete recovery.

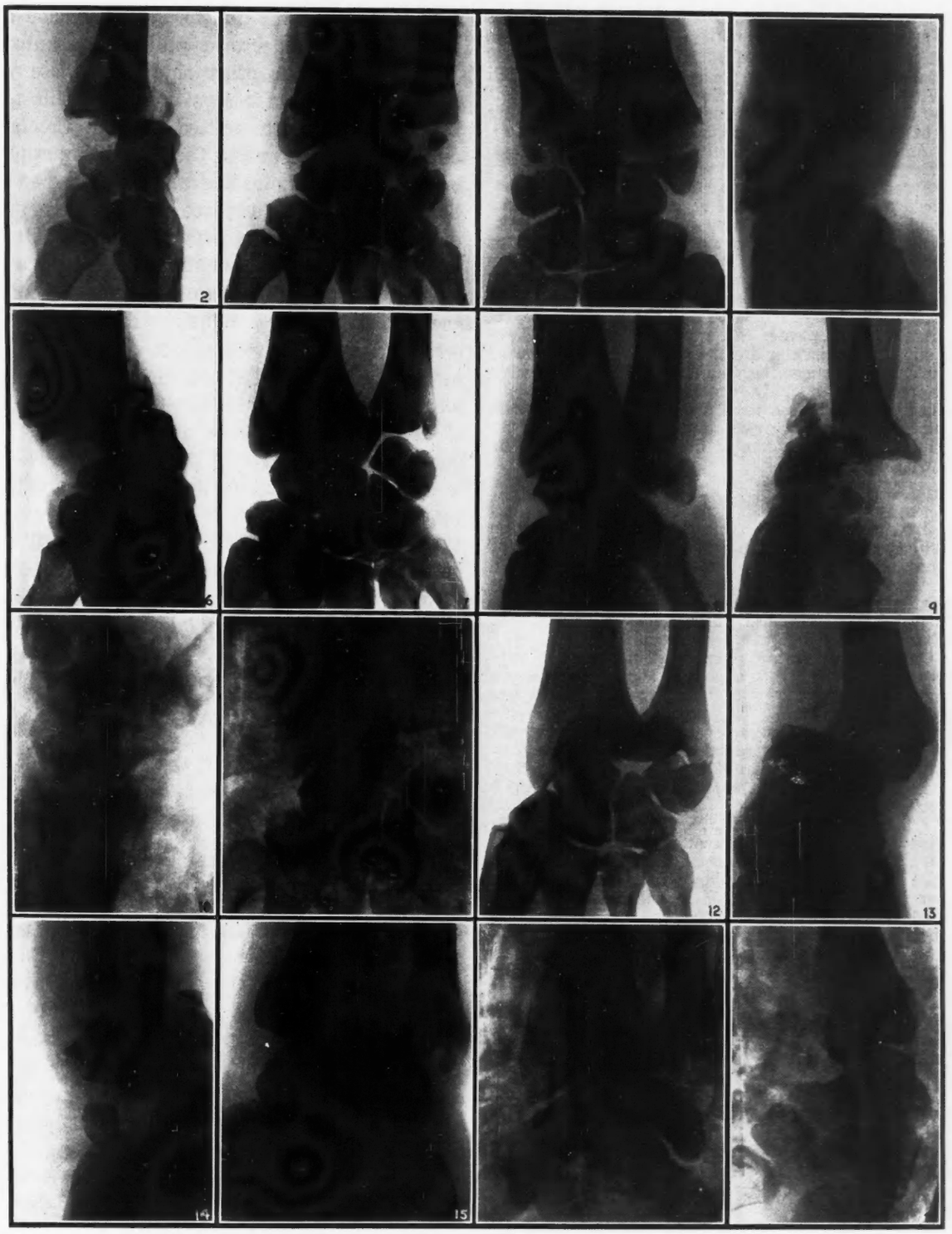

FIG. 2 *(Case 2)*.—Posterior dislocation of radio-carpal joint; lateral view.
FIG. 3 *(Case 2)*.—The same, antero-posterior view.
FIG. 4 *(Case 3)*.—Posterior dislocation of wrist with fracture of radial styloid; antero-posterior view.
FIG. 5 *(Case 3)*.—The same; lateral view. FIG. 6 *(Case 4)*.—Lateral view.
FIG. 7 *(Case 4)*.—Antero-posterior view.
FIG. 8 *(Case 5)*.—Posterior dislocation of the wrist; fracture of the posterior lip of the radius; antero-posterior view. FIG. 9 *(Case 5)*.—The same; lateral view.
FIG. 10 *(Case 5)*.—Lateral view after reduction. FIG. 11 *(Case 5)*.—Antero-posterior view after reduction.
FIG. 12 *(Case 7)*.—Anterior dislocation of wrist; antero-posterior view. FIG. 13 *(Case 7)*.—Lateral view.
FIG. 14 *(Case 8)*.—Colles' fracture with marked displacement simulating posterior dislocation of the wrist; lateral view. FIG. 15 *(Case 8)*.—Antero-posterior view.
FIG. 16 *(Case 8)*.—After reduction; antero-posterior view. FIG. 17 *(Case 8)*.—After reduction; lateral view.

CASE 6

W.V., male, aged 49, fell from a scaffold a distance of fifteen feet on March 29, 1922. He apparently landed on some stairs, with his hand bent under him. This resulted in a marked posterior dislocation of the left wrist together with a comminuted fracture of the lower end of the radius and a fracture of the ulnar styloid.

Admitted to the Montreal General Hospital, Dr. A. T. Bazin's service, he was placed under the care of Dr. Fraser B. Gurd. On April 1st an attempt was made to reduce the dislocation under gas and oxygen anæsthesia. Reduction was apparently easy; retention, difficult. Only by placing the hand in a position of palmar flexion could the position be maintained in plaster. A second attempt was made on April 10th, as the position was not considered satisfactory. The amount of palmar flexion was reduced and the plaster renewed. On April 24th, a plaster cast was again applied, following an effort to manipulate the wrist into a position of dorsiflexion. Commencing on February 17th, these casts were removed for daily massage on account of the marked stiffness of the wrist and fingers. On May 4th, manipulation of the wrist was done to increase the dorsi-flexion. A considerable degree of impairment in his wrist persisted.

CASE 7

J.T., male, aged 41. This patient, when sitting on a railing, lost his balance and fell from a height of fifteen feet, landing on a cement floor. He lost consciousness for a few minutes, but had recovered by the time the ambulance arrived, which took him to the Montreal General Hospital. It was impossible to obtain further information as to the nature of the injury.

On examination the right wrist presented a very obvious deformity, the so-called "garden-spade deformity", a reverse of the "silver-fork". There was no apparent fracture. The posterior margin of the lower end of the radius was easily palpable across the back of the wrist. The radial and ulnar styloids were unduly prominent but normally related to one another. The fingers were held in a flexed position and could with difficulty be extended.

An x-ray examination (Fig. 12) confirmed the diagnosis of an anterior dislocation at the radio-carpal joint. There was no fracture. Under light gas and oxygen anæsthesia, given in the outdoor department, the dislocation was easily reduced. A subsequent skiagram showed that the semilunar bone had failed to follow back with the carpus. He was subsequently admitted to the ward, and on February 2nd, my associate, Dr. Fraser B. Gurd, removed the lagging semilunar. He eventually had a good functioning wrist.

Such is the summary of 7 cases of dislocation at the radio-carpal joint, 6 backward and 1 forward. While it is true that in most of the cases there was an associated fracture of the radius or ulna, the fracture was merely incidental, and the essential lesion was actually a dislocation. This agrees with the attitude taken by Hamilton and quoted above.

ETIOLOGY

One approaches with hesitation a discussion of the etiology of wrist injuries, remembering the acuteness of the controversy which centred about the causation of Colles' fracture, and of which echoes still persist. On the one side, the advocates of the "arrachement" theory insisted that the injury was due to hyperextension and the consequent backward pull of the anterior ligament. On the other side were those who believed that the fracture was the result of a breaking strain transmitted through the hand and carpus to the radius, the force being applied obliquely upward and backward and causing the bone to break at the place where the compact end of the shaft joins with the cancellous bone of the expanded end. Opinion now favours the second view as applying to the common cause of the Colles' fracture, namely, falls on the outstretched hand. From a consideration of the cases here presented it would appear that dislocations are not produced in this way. In some of the cases the manner of production is not entirely clear, but it would seem that in all there is evidence of a greater degree of violence than that usually productive of a Colles' fracture.

In analyzing the posterior dislocations it will be noted that Cases 5 and 6 occurred in falls from a height; in Cases 2 and 4 the wrist was obviously forced backward when in a position of marked dorsi-flexion. It is possible that a forcible supination of the carpus may sometimes assist in producing the displacement. The trauma in Case 1 was of a very unusual type, a direct backward thrust on the carpus while the lower end of the radius was held fixed. In the one case of forward dislocation (Case 7) the fall was from a height, but we have no information as to the position of the hand. There was however no evidence of bruising on the back of the hand, and it is interesting to note that the same observation was made by Mr. Haydon in the account of his case given above. Forced pronation of the carpus may have played a part.

It may be noted in passing that the so-called "chauffeur's fracture", a modern development arising from the back-fire of a motor in cranking, is produced by a backward thrust on the palm with the hand in hyperextension. This results in a very low transverse fracture or a breaking off of the radial styloid.

DIAGNOSIS

The diagnosis of a dislocation of the wrist can as a rule be made with little difficulty. In the posterior dislocation a pronounced "silver-fork deformity" is found, occupying a more distal position than in a Colles' fracture; whereas in the anterior dislocation one sees the so-called "garden-spade deformity" of the reversed

Colles', similarly exaggerated and at a lower level. This distinction is well drawn in Helferich's Atlas of Fractures and Dislocations, where by means of lateral views several injuries which occur at or near the wrist-joint are compared.

The marked displacement of a dislocation must necessarily be accompanied by extensive injury to the ligaments, especially the anterior and the posterior, with a great amount of disturbance to the tendons, both flexor and extensor, and the frequent association of a certain amount of injury to bone. The soft tissue damage is accordingly greater than that seen in the uncomplicated fractures and results in a greater amount of swelling. There is usually palpable, if the cases are seen before swelling masks the picture, a distinct groove above the displaced carpus, into which the finger tips may be pressed. A point of importance is the preservation of the relative position of the radial and ulnar styloids to one another and to the shafts of the bones. One additional sign of value is the greater fixity of the fingers. This is more marked in dislocations than in the Colles' type of fracture, on account of the greater displacement and consequent increase in the interference with the tendons. In the posterior dislocation the stretching of the extensor tendons limits the flexion of the fingers, whereas in the anterior displacement extension of the fingers is impaired.

Simple as the diagnosis would appear, it is not without pit-falls, as the following case report indicates. The x-ray is after all the court of last appeal.

CASE 8

G.M., male, aged 19. This case is cited because it illustrates a mistake in diagnosis. I saw the accident. It occurred late in the evening of November 16, 1932, during an ice-hockey game. The patient, a young giant, collided with another player when going at great speed. When in the act of falling his outstretched hand struck against the rigid body of a third player. Examination suggested that we had an exact replica of Case 5, seen a fortnight before: the marked "silver-fork deformity", the prominent anterior margin of the lower end of the radius, the radial and ulnar styloids apparently in normal relation to the shafts and to one another.

I took the patient to the Western Division of the Montreal General Hospital where Dr. J. W. McKay kindly took an x-ray of the injury. The film showed not a dislocation but a fracture, sheering off the entire lower end of the radius and carrying the carpus to a plane behind the dorsum of the radius. The pisiform was left floating, and I was in some doubt as to its fate (Figs. 14 and 15).

Under gas-oxygen anæsthesia reduction was accomplished within an hour following the injury. The wrist was put in a circular plaster, with slight volar flexion. A check-up skiagram indicated perfect reposition, including the displaced pisiform (Figs. 16 and 17). The plaster was renewed after one week with the hand in the axis of the forearm. A wrist-strap was applied after three weeks. It seems incredible but true that he again took part in a league hockey game exactly four weeks from the day of the accident. Apparently he suffered no harm therefrom, for he tells me now, two years after the injury, that he would never know the wrist had been broken. He further said that he was practising hockey, cast and all, three days after the accident. Such is the enthusiasm of youth!

TREATMENT

Reduction as a rule is easily accomplished, especially if the case is seen early. That it is sometimes accompanied by difficulties is illustrated in Case 7, where in the replacement of an anterior dislocation the semilunar bone proved refractory and had to be removed; likewise in Case 6, where reduction seemed to be easily accomplished but the retention proved difficult. There is an advantage in fixing the wrist in a slight cock-up position, but one must be certain that this does not prejudice the position if a fracture be present. The reduction is usually followed by more swelling than in the case of the Colles' fracture, owing to the greater amount of tearing of the capsule and stripping of the tendons, so that in the cases uncomplicated by fracture the earlier a moderate degree of mobilization can be carried out the better. When the dislocation is accompanied by fracture the after-treatment is that of a Colles' fracture.

SUMMARY

This paper presents an account of 7 dislocations of the wrist, 6 backward and 1 forward.

A brief historical review is given in which it is pointed out that until a century ago this condition was thought to be the *usual* result of a fall on the outstretched hand. The injury is now regarded as being relatively uncommon.

A discussion on the etiology, diagnosis and treatment is included.

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POLYCYTHÆMIA VERA, WITH SPECIAL REFERENCE TO THE NERVOUS MANIFESTATIONS: AN ANALYSIS OF NINE CASES*

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THE clinical picture of polycythæmia vera has now become well established, but the importance of nervous symptoms as a part of it has not as yet become generally recognized by the medical profession, even though they have been prominent in most of the reported cases.

Vaquez'[1] original case, in 1892, had vertigo, buzzing in the ears, and paroxysms of dizziness. Osler,[2] who stimulated great interest in this disease, reported in 1903 four cases which he had himself observed, and collected 5 others from the literature. Of these 9 cases, all except one had nervous symptoms. Christian,[3] in 1917, called particular attention to the frequency and importance of nervous symptoms in this condition. Of the 10 cases observed by him all but 2 showed very definite nervous symptoms, and in most the nervous disturbances were the chief cause of the patient's discomfort. The most frequent symptoms were headache and dizziness. Other common symptoms were blurring of vision, transient blindness, hemianopsia, and diplopia. Sensory disturbances such as paræsthesiæ were also common, and several showed disturbances such as paresis and paralysis. In case No. 4, even after the blood picture was known, it was thought possible that some of the focal symptoms were due to a brain tumour. At operation, by Dr. Harvey Cushing, no tumour was found. A cerebral decompression was performed. Death followed, and the autopsy revealed bilateral thrombosis of the cerebral arteries with areas of degeneration of the cerebrum. Brockbank[4] in 1929 analyzed 56 cases from the Mayo Clinic from the neurological point of view. He stated that the complaints of patients suffering from polycythæmia vera are often referable to the nervous system, and that they do not have a localizing value. They are often misleading, and may be dismissed as functional. Vascular accidents, which are by no means uncommon in this disease, may lead to mistaken diagnoses and unnecessary surgical procedures. Still more recently, Sloan,[5] Winkelman and Burns,[6] in 1933, reported neurological and neuropsychiatrical features in this disease. Minot[7] states that the gastrointestinal symptoms, as well as those referable to the central nervous system, heart, kidney, and special sense organs, may lead to an incorrect diagnosis of some primary local disease.

The following 9 cases illustrate the frequency of nervous symptoms as well as some of the difficulties in diagnosis.

CASE 1

A female, aged 42 years, was admitted to the Montreal General Hospital into the service of Dr. C. P. Howard, on June 19, 1931, complaining of headache, attacks of dizziness, deafness, poor vision, momentary blindness, and attacks of numbness in the fingers and legs. Many of these symptoms were present for four years prior to admission. Examination showed a ruddy complexion, with cyanosis of the lips and fingers and injection of the conjunctivæ. The fundi showed marked engorgement of the veins, but were otherwise normal. The lungs were negative to physical examination and x-ray. The heart was not enlarged, even though the blood pressure remained around 210, systolic, and 120 diastolic. The spleen was enlarged and readily palpable. Urinalysis revealed a trace of albumin, with an occasional granular cast. The red blood count was 9,100,000; hæmoglobin, 145 per cent (H); the white blood cells were 14,000; the platelets varied from 769,000 to 1,575,000. Following a venipuncture, she suffered a severe subcutaneous hæmorrhage in the arm. She also suffered from bleeding gums.

She has received x-ray therapy over the long bones since 1931, and her symptoms have largely disappeared, although the hypertension persists and is not affected by the reduction in the red blood count.

CASE 2

A female, aged 34, was admitted to the private service of Dr. H. A. Lafleur, December 15, 1923, complaining of severe burning pains in the fingers and toes, dizziness, headache, and sensations of beating and fullness in the head, of about one year's duration. Her mother had noted one year previously that the patient's

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hands were abnormally red. Her complexion was ruddy, with cyanosis of the lips, ears, and fingers. The spleen was palpable, and the fundi were reported as bluish-black in appearance. The red blood count was 8,080,000; hæmoglobin, 156 per cent; and the white cells 14,800. Urinalysis showed one plus albumin, with a few granular casts. The basal metabolic rate was plus 13. A course of twelve x-ray treatments produced temporary improvement. Six months later she was treated in the Howard A. Kelly Hospital, Baltimore, with radium emanations, and phenylhydrazin hydrochloride. She again improved for a while, but under observation the red blood count increased, again accompanied by a return of symptoms. Since that time, eleven years ago, the patient has learned to report the recurrence of symptoms which have been controlled by short courses of phenylhydrazin. She is now 45 years of age and able to lead a reasonably active life.

CASE 3

A male, aged 43, entered the Montreal General Hospital, June 4, 1929, in the service of Dr. A. T. Bazin, complaining of injuries to the head and chest. On May 13, 1929, the patient had been knocked down and rendered unconscious in a motor accident. He stated that the nose bled for two days, and that a headache persisted for a week after the accident. Examination was centred on the local condition which consisted in multiple abrasions of the skin of the left forehead. X-rays of the skull were negative for fracture, and he was discharged with the diagnosis of multiple contusions. He returned one year later, this time complaining of fainting spells, and attacks of unconsciousness. His colour was noted to be unusually ruddy, the conjunctivæ were injected, the lips cyanosed, and the fundi a deep red colour. The spleen was readily palpable. Albuminuria and cylindruria were present. The red blood count was 9,500,000; hæmoglobin, 145 per cent (H); and the white cells, 6,600. A diagnosis of polycythæmia was made. Further x-rays of the skull, including encephalograms, were negative. Nevertheless, a neuro-surgical consultant so strongly suspected the presence of traumatic epilepsy that he advised surgical exploration. Phenylhydrazin hydrochloride produced temporary improvement in the symptoms. The man subsequently went back to Norway, his native land, where he was operated upon for suspected traumatic epilepsy by Dr. Olivecrona, in Oslo. Nothing was found to account for the symptoms. A severe post-operative hæmorrhage necessitated a second operation.

CASE 4

A male, aged 61 years, entered the service of Dr. F. S. Patch on January 12, 1923, complaining of pain in the right upper quadrant of the abdomen and hæmaturia. He was a rancher by occupation. A diagnosis of cholelithiasis had been made previously and a cholecystostomy performed. No stones were found. The symptoms returned in six months. On admission his colour was noted to be good, and the complexion dark. The spleen was palpable two fingers' breadth below the costal margin. The liver edge could be felt one hand's breadth below the right costal margin. Cystoscopic examination revealed bleeding and diminished flow of urine from the right ureter. The red blood count was 3,800,000; hæmoglobin 80 to 85 per cent (H). He was discharged with a diagnosis of cirrhosis of the liver, enlargement of the prostate, and renal hæmorrhage of unknown origin. He returned nine years later, February 8, 1932, complaining of frequency of urination and nocturia. On this admission, he had a florid complexion, the liver was palpated one, and the spleen three, finger's breadth, below the costal margin, and the prostate was moderately enlarged. Urinalysis showed a trace of albumin, but no casts. The red blood count was 6,600,000; hæmoglobin, 98 per cent; white blood cells, 8,200. In view of the great distance of his home from medical aid, the patient chose to undergo a prostatectomy rather than resort to catheter life. A fatal post-operative hæmorrhage occurred on the second day. No post-mortem was obtained.

CASE 5

A male, aged 51 years, came to the surgical outdoor department on July 3, 1933, complaining of pain in the left great toe and calf. Nothing local could be found to account for the pain, and the patient was referred to the medical clinic, to which he returned three months later. This time he complained of pains in the arms and legs, headache, and dizziness. His complexion was ruddy, and cyanosis of his lips and ears was striking. The lungs were negative to physical examination and x-ray. The heart was not enlarged, despite the blood pressure readings of 200, systolic, and 100, diastolic. The spleen was readily palpable, and the liver edge could just be felt. The fundi showed a peculiar dark red colour, with engorged purplish veins. The red blood count was 7,100,000; hæmoglobin, 130 per cent (H); white blood count 14,000. A trace of albumin, and a few casts were found in the urine. Extensive studies were done on the service of Dr. A. H. Gordon, who made a diagnosis of polycythæmia vera, with the associated conditions of generalized arteriosclerosis, and hypertension. Phenylhydrazin hydrochloride and x-ray therapy produced a drop in the red blood count to 4,500,000, with almost complete relief of symptoms. Under observation the spleen diminished in size, the albuminuria disappeared, but there was no appreciable effect on the blood pressure readings. He was discharged nine weeks after admission, and has reported to the outdoor clinic regularly.

CASE 6

A female, aged 53, first came to the medical outdoor department on March 24, 1926, complaining of numbness and tingling of the hands and feet, pain in both thighs, and difficulty in walking. These symptoms appeared subsequent to the taking of some arsenical preparation for rheumatic pains in the back, one month previously. She was referred to the department of neurology, where a diagnosis of arsenical neuritis was made. She returned at frequent intervals to that clinic until 1928. She was lost sight of until she reappeared in the medical clinic September 2, 1931, where the spleen was noted to be enlarged, with the red blood count 4,910,000 and the white blood cells 8,050. A diagnosis of Banti's disease was considered. Subsequent blood counts showed the red blood count to vary from 6,100,000 to 7,000,000 with a hæmoglobin of 118 per cent (H). A diagnosis of polycythæmia vera was made by Dr. E. S. Mills, who instigated roentgen-ray therapy. Since that time the symptoms have been controlled and the red blood cells are maintained at approximately the level of five million per c.mm.

CASE 7

A male, aged 60, was admitted to the service of Dr. C. P. Howard on July 17, 1933, complaining of pain in the left upper quadrant, radiating across to the right side of the abdomen and into the right axilla. His symptoms began one year previously. He had been twice admitted to another general hospital where a small mass had been felt in the mid-epigastrium, about one inch in diameter, which would disappear on pressure, and was slightly tender. A tentative diagnosis of epigastric hernia was made, and an operation performed. The mass proved to be composed of lobulated fat, with a pedicle attached. No definite sac could be demonstrated. The symptoms persisted, his appetite became poor, weakness and dyspnœa on exertion increased, and he lost considerable weight. He was later seen by Dr. E. S. Mills who recommended his admission to the Montreal General Hospital for further study. Examination at this time revealed a duskiness in addition to the ruddy complexion. The lips, fingers and toes were cyanosed. The liver edge was palpable at the costal margin, and the spleen could be felt two fingers' breadth below the left costal margin.

Urinalysis revealed a faint trace of albumin and an occasional cast. The red blood count was 8,100,000; white cells, 16,000; hæmoglobin, 126 per cent (H), with a normal differential white count. Even after the above findings had been recorded, a diagnosis of partial intestinal obstruction was made, following the administration of a barium enema. A second operation was performed, but no obstruction was found. At this operation the spleen was noted to be about four times its normal size. Forty-eight hours after operation an extensive hæmorrhage occurred into the wound, which required packing. Subsequent x-ray treatment reduced the red blood count, with marked symptomatic improvement.

CASE 8

A female, aged 54 years, came to the Hæmatological Clinic on December 7, 1932, complaining of dizziness and hot flushes of four years' duration. Menopause had occurred seven years previously. One year ago she suffered what she called a nervous breakdown. She stated that she bleeds very easily, and that she had had a great deal of "fullness in the head". Inspection revealed a very ruddy complexion, suffused, injected conjunctivæ, with moderate cyanosis of the lips. The spleen was readily palpable. The red blood count was 6,630,000; hæmoglobin, 115 per cent (H); white cells, 8,200; platelets 823,000. Her symptoms have never been severe and as yet she has not received any treatment.

CASE 9

A male, aged 25 years, was admitted to the private service of Dr. A. H. Gordon on May 22, 1933, complaining of vomiting blood, abdominal discomfort and weakness. These symptoms began one year prior to admission. In June, 1932, he first noticed swelling of the abdomen, associated with some pain and vomiting. His condition progressed to such an extent that he became alarmed and consulted a physician, who reported ascites of extreme degree and enlargement of the liver. Under quartz-lamp treatment and bed rest the abdominal fluid subsided at first, but re-accumulated, necessitating the removal of 3,600 c.c. of clear straw-coloured fluid. Two weeks later, 6,900 c.c. of similar fluid were removed. Shortly after this, in December, 1932, he suffered a severe gastric hæmorrhage. Fluid appeared in the right pleural cavity, 900 c.c. being removed. At this time the physician noted a large irregular liver, an enlarged spleen and ascites, as well as a definite icteroid tint to the scleræ. The blood Wassermann reaction was negative, and the blood pressure normal. The red blood count was 4,100,000; hæmoglobin, 70 per cent; the leucocytes, 11,000 per c.mm. The ascites and pleural effusion subsided during February, 1933, but the patient never recovered his strength. A few days after his arrival in Montreal, while awaiting admission, he experienced a sudden pain in the epigastrium, and vomited up a considerable amount of dark red blood mixed with food. He vomited blood twice subsequently, the total quantity being estimated at one to two quarts. Examination revealed good nourishment and development, with the colour of the face and conjunctivæ a little better than that of the average individual. There was a definite icteroid tinge to the scleræ. The abdomen was prominent, slightly distended, and there was dullness in the flanks.

The liver and spleen were enlarged and palpable. The red blood count was 7,500,000; hæmoglobin, 105 per cent; white cells, 11,850. On the eighth day signs of fluid developed in the right pleura. These signs increased, so that on the 14th day, 1,000 c.c., on the 21st day, 1,800 c.c., and on the 26th, 1,300 c.c. of straw-coloured fluid were removed. The fluid re-accumulated rapidly necessitating fourteen aspirations within the next month. During this time it was noted that the abdomen was swelling, despite the use of salyrgan intramuscularly, and x-ray treatment over the spleen. The ascites continued, and on August 21st, three months after admission, a laparotomy and omentopexy were performed with insertion of Patterson's buttons. The liver was noted to be large and rubbery, and without nodules. Many sutures were required to control bleeding after biopsy. The spleen was estimated to be eight times its normal size. The omentum was adherent to both spleen and parietes, and in the mid-abdomen at one point showed three small veins in a group passing to the parietes in the neighbourhood of the falciform ligament. Following the operation the abdomen still required paracentesis, but less frequently. The patient subsequently developed severe unexplained hæmaturia. The liver was thought to have diminished in size, but the spleen if anything became larger. He suffered several extensive epistaxes.

Microscopic examination of the liver tissue revealed a typical picture of portal cirrhosis. Throughout his stay in hospital no evidence of malignancy could be found. There was never any œdema of the extremities. He complained of abdominal discomfort, weakness and dyspnœa which varied with the aspirations. He was discharged on September 23, 1933, four months after admission. Diagnosis: polycythæmia vera, complicated by jaundice, hepatic cirrhosis, hæmatemesis, and hydrothorax. Subsequent to his arrival at home he suffered further hæmorrhages from the stomach and ascites, which necessitated frequent tappings. He became progressively weaker and died on December 26, 1933. No autopsy was performed.

DISCUSSION

The accompanying Table summarizes the findings of the 9 cases here reported.

Six of our 9 cases sought medical advice for symptoms referable to the nervous system. Headache, dizziness and paræsthesiæ were the most common complaints. The length of time under observation varied from six months to eleven years. One case, No. 3, is comparable to case 4, reported by Christian,[3] in which a cerebral decompression was performed for a suspected brain tumour. The differential diagnosis in our case was particularly difficult because of the presence of a preceding injury to the skull.

The three cases with abdominal complaints also offered diagnostic difficulties, as evidenced by fruitless surgical procedures. Patient 4 had been operated upon for gall stones without any being found. Patient 7 had had two operations within six months, one for a suspected epigastric hernia, the other for an atypical incomplete intestinal obstruction, and both failed to locate the cause of or alleviate the symptoms. Patient 9 is of particular interest because of the unusually early age at which he sought medical aid. This can however be explained by the occurrence of complications. The average age of onset of symptoms in the remaining 8 cases was 50 years, which corresponds to the average age in other reported cases. Weber[8] reports a similar case of polycythæmia vera, complicated by jaundice, cirrhosis of the liver, and fatal hæmatemasis. The case here reported is, to my

POLYCYTHÆMIA VERA. (VAQUEZ-OSLER DISEASE.) (ERYTHRÆMIA.)

Case	Age	Sex	Duration	Symptoms	Differential Diagnosis	Blood			Urine		Blood Pressure	Heart	Spleen	Liver	Fundi	Hæmorrhage	Basal Metabolic Rate	Comment
						Red Blood Cells in millions	White Blood Cells in thousands	Hgb. Per cent	Albumin	Casts								
1	42	F	2	Headache; dizziness; poor vision; pain in leg.	....	9.6	18	145	Trace	Present	220/120	N	Palp.	Palp.	Abn.	Gums Arm	..	Symptomatic improvement. X-ray treatment.
2	34	F	11	Headache; dizziness; fainting; paræsthesia.	....	8.8	14	156	Trace	Present	110/70	N	Palp.	0	Abn.	Arm	13	Alive and well after eleven years phenylhydrazin.
3	43	M	2	Fainting spells.	Epilepsy.	9.5	7	144	Trace	Present	140/85	N	Palp.	Palp.	Abn.	Post-operative	..	Brain operation; nothing found.
4	61	M	10	Abdominal pain.	Cholelith.; Cirrhosis; enlarged prostate; hæmaturia R.	6.5	8	98	Trace	0	110/80	N	Palp.	Greatly enlarged.	..	Renal	..	Prostatectomy. Post-operative hæmorrhage. Death.
5	51	M	½	Headache; dizziness; pain in right leg and toe.	Chronic nephritis. Hypertension.	7.7	14	135	Trace	Present	190/110	N	Palp.	Palp.	Abn.	Nose	−1	Improved. X-ray treatment.
6	53	F	6	Numbness in fingers and toes; pains in stomach and chest.	Arsenical poisoning; Banti's disease.	6.8	14	120	Trace	Present	190/100	N	Palp.	Palp.	..	....	13	Improved. X-ray treatment.
7	60	M	2	Abdominal cramps; weakness.	Epigastric hernia; intestinal obstruction.	8.1	16	126	Trace	Present	110/70	N	Palp.	Palp.	..	Post-operative	..	Improved. X-ray treatment.
8	54	F	2	Dizziness; fullness in head.	....	6.6	8	115	0	0	120/80	N	Palp.	0	..	Skin	..	Improved.
9	25	M	½	Vomiting of blood; abdominal discomfort; weakness.	Banti's disease; Hodgkin's disease.	7.5	12	105	Trace	Present	125/80	N	Palp.	Palp. enlarged.	..	Stomach	..	Not improved.

knowledge, the first to have, in addition to the ascites, an extensive recurring hydrothorax.

Three patients (1, 5, 6) had an associated hypertension at the time the polycythæmia was recognized. It is impossible in each instance to state which condition occurred first. These cases would correspond to what the German authors[9, 10] classify as the "hypertonische Form". We have included them under the general heading of Vaquez-Osler disease. Patients 1, and 5, observed over a long period of time in hospital, received treatment which reduced the red blood count, resulting in marked symptomatic improvement, but failed to lower the blood pressure. In all three cases the heart was found to be normal in size. Del Baere[11] pointed out in 1926 that cardiac hypertrophy is not rarely absent in polycythæmia, even where the blood pressure is above normal.

Splenomegaly was present in every case, which with the blood picture formed the criteria for diagnosis. In addition the liver was palpable in all except one.

The tendency to bleed was exemplified by its occurrence in all cases except one. Every patient subjected to surgical procedures suffered from post-operative hæmorrhage. This experience has so impressed us that every known or suspected case of polycythæmia is admitted into hospital prior to an operation of any kind, including tooth extractions.

Treatment of our cases has consisted in the use of phenylhydrazin hydrochloride and x-ray. Patient 2 has been satisfactorily treated by short courses of phenylhydrazin in small doses for eleven years. In general, x-ray therapy in repeated small doses over the long bones, as

recommended by Pack and Craver,[12] has in recent years been the method of choice.

SUMMARY

Nine cases of polycythæmia vera are reported from the Montreal General Hospital. The symptoms were very variable, often simulating many other conditions. Nervous symptoms were the most common, and were the outstanding ones in 6 cases. Of these headache, dizziness, and paræsthesiæ were the most frequent.

Four of the 9 were females.

The average age of onset of symptoms was fifty years, excluding one patient aged 25 years.

One patient has been under observation eleven years.

The average red blood count at the time symptoms were pronounced was 8,100,000.

Albuminuria was a constant finding, and casts were found in all but two cases.

Three of the 9 patients had an associated hypertension which was not affected by treatment.

The heart was normal in size, even in the cases with hypertension.

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FURTHER OBSERVATIONS FOLLOWING THE ADMINISTRATION OF TETANUS TOXOID

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IN a previous communication[1] one of us has reported the development of significant amounts of tetanus antitoxin in the blood sera of 28 of a group of 29 adults subsequent to three doses of tetanus toxoid. Confirmatory evidence was also reported showing the efficacy of a primary stimulus with tetanus toxoid in the production of tetanus antitoxin by horses.[2] It was considered desirable, therefore, to determine the residual antitoxin in the same group of adults a year after the administration of the last dose of toxoid, and to observe whether there was a similar effect following the secondary stimulus in man as has been shown in horses.

With the exception of subject 7, the same persons reported upon previously were available for further observation. The data are based upon the American unit of tetanus antitoxin, which is equivalent to twice the International unit. Guinea pigs were used as test animals in the determination of serum antitoxin as before, and the same lots of tetanus toxoid were used for the secondary stimulus.

RESIDUAL TETANUS ANTITOXIN IN MAN A YEAR AFTER TETANUS TOXOID

Table I shows the maximum antitoxin titre attained by 28 persons within a period of 7 months after the injections of three doses of tetanus toxoid and the antitoxin levels of the respective sera 12 to 15 months after the last injection. After a year two sera (from subjects 21 and 26) showed no evidence of antitoxin (< 0.001 units per c.c.),* and a third serum was lost through breakage. Of the remaining 25 sera available 6 retained antitoxin at about the maximum titre shown shortly after the first series of toxoid injections; the remainder all showed a diminution in antitoxin titre. These 25 sera, obtained a year after the injection of

* The symbols $>$ and $<$ represent "more than" and "less than", respectively.

toxoid, showed residual tetanus antitoxin in significant amounts, 5 showing $> 0.001 < 0.01$ unit per c.c. of serum, 17 showing 0.01 or $> 0.01 < 0.1$ and 3 showing 0.1 unit.

TABLE I
PERSISTENCE OF TETANUS ANTITOXIN FOLLOWING THREE DOSES OF TETANUS TOXOID

Subject number	*Maximum response to first series*	*Antitoxin level 12–15 months after last dose*
	Units per cubic centimetre of serum	
1	0.1	0.01
2	0.5	>0.1<0.5
3	>0.1	>0.001<0.01
4	>0.1<0.5	>0.1<1.0
5	>0.001<0.1	0.01
6	0.25	>0.01<0.1
8	>0.1<0.5	>0.01<0.1
9	>0.1	>0.01<0.1
10	0.25	0.01
11	>0.1<0.5	>0.01<0.1
12	>0.1<0.5	*
13	>0.25<0.5	>0.01<0.1
14	0.1	>0.001<0.1
15	0.1	>0.01<0.1
16	>0.01<0.1	>0.01<0.1
17	>1.0<5.0	>0.1<0.25
18	>0.1<0.25	>0.01<0.1
19	>0.1<0.25	>0.01<0.1
20	0.01	>0.001<0.01
21	0.003	<0.001
22	>0.01<0.1	>0.01<0.1
23	0.01	>0.001<0.01
24	0.01	>0.001<0.01
25	>0.01<0.1	>0.01<0.1
26	<0.001	<0.001
27	>0.01<0.1	>0.01<0.1
28	>0.1<0.25	>0.01<0.1
29	0.25	>0.01<0.1

* Container broken.

RESPONSE IN MAN TO A SECONDARY STIMULUS WITH TETANUS TOXOID

Fourteen of the above persons were arbitrarily selected about a year after having had tetanus toxoid and injected with a single dose (1 c.c.) of the same lots of toxoid as used previously, namely, one prepared at the Pasteur Institute, Paris, and the other at the Connaught Laboratories, University of Toronto. Blood serum was obtained a week and a month, respectively, after this secondary stimulus, to ascertain the antitoxin response. The results are shown in Table II.

With the exception of subject 17, one week after a single dose of tetanus toxoid all showed an antitoxin increase from double to more than tenfold the maximum attained after the first series of injections; ten of these persons showed more than a tenfold increase. Although subject 17, with 2.5 units per c.c., did not show as great a relative increase of antitoxin at this time as did the others, it should be noted that this individual had toxoid prior to the first series reported, in consequence of which it is possible that this antitoxin level represents his maximum response to a secondary stimulus. It is noteworthy that 7 persons developed 2.5 units or more per c.c. of serum; 3 showed antitoxin to a level of 1.0 unit or slightly more; three $> 0.1 < 1.0$, and subject 26 showed $> 0.01 < 0.1$

TABLE II
TETANUS ANTITOXIN RESPONSE FOLLOWING A SECONDARY STIMULUS WITH TETANUS TOXOID

Subject number	*7 days after injection*	*1 month after injection*
	Units per cubic centimetre of serum	
2	>5.0	5.0
5	>0.1	>0.1<1.0
6	>0.5	1.0
8	>2.5<5.0	>2.5<5.0
11	>2.5<5.0	2.5
12	5.0	>1.0<5.0
14	>1.0	1.0
16	0.5	>0.5<1.0
17	2.5	>1.0<2.5
19	>2.5<5.0	>1.0<2.5
23	>0.1<0.5	>0.1<0.5
24	>1.0<2.0	>0.5<1.0
26	>0.01<0.1	>0.01<0.1
28	>2.5<5.0	2.5

unit per c.c. of serum. The last is of particular interest since prior to the secondary stimulus it was not possible to find 0.001 unit per c.c. and as such this individual was noted with subject 5 as examples of refractoriness to immunization.

The titre of serum antitoxin was also determined at an interval of 92 and 72 hours, respectively, after the secondary stimulus for subjects 8 and 17, representing the groups receiving the two different lots of toxoid. These showed in sequence $> 0.1 < 0.5$ and 0.25 units of tetanus antitoxin per c.c., a level such as we have found to be present in human blood sera within a similar interval after the usual prophylactic dose (1500 units) of tetanus antitoxin.[3] There is evidence of a diminution of blood antitoxin a month after the secondary stimulus in 8 subjects, and no indication of a drop in antitoxin titre in the remaining 6 subjects after the same interval.

COMMENT

The demonstration of residual amounts of tetanus antitoxin in the blood sera of 25 out of 27 adults a year after the injection of three

doses of tetanus toxoid is of distinct value as an indication of the persistence of this antitoxin induced by active immunization. However, the presence of such amounts as found here is not necessarily evidence of a relative immunity to tetanus. It has been shown by various investigators that the incidence of a primary stimulus predisposes to the more rapid development and enhancement of antibody titre upon subsequent injection of, or exposure to, the particular antigen. Upon these facts is based the current conception of the resistance developing to disease as a result of active immunization against various pathogenic organisms or their products.

Although the number here reported is small, there is definite evidence that a *secondary* stimulus with tetanus toxoid induces not only the rapid development of tetanus antitoxin in man but also an enhancement of antitoxin titre within a week, on an average of about twenty times that of the residual amounts found a year after three doses of toxoid. Since three days after the prophylactic injection of 1500 American units of tetanus antitoxin the blood serum of man has been shown to contain 0.1 to 0.25 unit per c.c., it is evident that within a week of the secondary stimulus 13 persons out of a group of 14 developed at least the equivalent of that afforded by a prophylactic dose of antitoxin. Further, the serum titre of these same persons continued after a month to show antitoxin at levels sufficient to retain this degree of protection. Although one of the group failed to develop antitoxin to the level stated (0.1 to 0.25 unit per c.c.) there is no doubt that it was possible in this instance to induce the early development of a measurable amount of antitoxin as a result of a secondary stimulus, whereas it was not possible to show that such followed the first series of toxoid injections.

In view of the recognized advantages of active immunization over passive immunization our limited findings supply some evidence of the value of tetanus toxoid as an immunizing agent worthy of more careful consideration, particularly with a view to determining whether this is a practical means of reducing the hazard of tetanus incident to exceptional exposure to infection.

SUMMARY

Of 27 persons previously reported, tetanus antitoxin was demonstrable in the sera of 25, 12 to 15 months after the last dose of toxoid, of whom 3 only showed as high a level as 0.1 unit per c.c. of serum. A definite diminution of serum antitoxin was found in 20, and 6 apparently maintained their maximum titre over this length of time.

In 14 adults injected with 1 c.c. of tetanus toxoid as a secondary stimulus an increase of serum antitoxin was found 7 days later of from double to an hundredfold that of the resting level after a year, which increase, a month later, averaged about 16 times the residual antitoxin. Thirteen developed antitoxin to a comparable level, or in excess of that afforded by the subcutaneous injection of the prophylactic dose of tetanus antitoxin (0.1 to 0.25 unit per c.c.). Two showed the development of 5 units per c.c.; 5 showed 2.5 or $> 2.5 < 5.0$; three showed 1.0 or $> 1.0 < 2.5$; 3 showed $> 0.1 < 1.0$; and one developed $> 0.01 < 0.1$ unit per c.c. of serum.

These results present definite evidence of the immunizing value of a primary stimulus with tetanus toxoid when followed at a suitable interval by a secondary stimulus with the same antigen. Further, the antitoxin response to the secondary stimulus, as shown herein, suggests the probability of a similar response to toxin developed as the result of infection with *Cl. tetani* by persons who have previously received tetanus toxoid.

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LIGATURE OF THE ANGULAR VEIN IN FURUNCLES OF THE UPPER LIP AND NOSE.—H. Schaer alludes to the not inconsiderable mortality, from thrombosis of the superior ophthalmic vein extending to the cavernous sinus and from basal meningitis, in pustules of the upper lip and nose. As a preventive measure he recommends, describing three illustrative cases, ligature under local anæsthesia of the angular vein, which communicates with the cavernous sinus. He prefers an incision of 1 cm. internal to the inner canthus—that is, considerably higher than that recommended by American writers: the vein may be superficial or embedded in the quadratus labii superioris muscle. In certain cases ligature of the anterior facial vein and/or the internal jugular veins is called for in addition. The ligature is best done before the appearance of rigors. In one of Schaer's cases thrombosis of the anterior facial vein was palpable after a peritonsillar abscess: it was divided with the cautery at the same time as a section of the angular vein was ligatured and excised.—*Zentralbl. f. Chir.*, Aug. 18, 1934, p. 1907; Abs. *Brit. M. J.*

PREDICTION OF BASAL METABOLISM FROM PULSE PRESSURE AND PULSE RATE*

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BASAL metabolic rate determination is now a well established procedure in clinical medicine; it has stood the test of many years of experience. When properly performed and the data obtained are properly interpreted there are very few more useful tests in medicine. The clinical application of this procedure is still increasing, and, for this reason, many attempts have been made to simplify it. Many technical difficulties have been overcome by the newer types of apparatus. Some of this apparatus is now portable. A portable apparatus does not, however, necessarily imply that the test is portable. With very few exceptions, the ideal conditions necessary for basal metabolic rate determination are obtainable in well-conducted laboratories only; contrary to the claims of manufacturers, this test is far from being an office procedure. The pitfalls are many;[1] for example, *oxygen consumption* is not necessarily synonymous with *basal heat production*. For this reason, a number of attempts have been made to arrive at the rate of metabolism *indirectly* by the study of conditions which have been found to be roughly proportional to the basal metabolic rate. Amongst these conditions are pulse pressure and pulse rate.

In 1922, Read[2] introduced the following formula: BMR = 0.683 (PR + 0.9 PP) – 71.5 where BMR = basal metabolic rate; PR = pulse rate, and PP = pulse pressure. From experience with 300 cases Read concluded that basal metabolic rate may be predicted with an error of about 10 per cent in about 60 per cent of cases, and in about 91 per cent of the cases it may be predicted with an error of about 20 per cent. This error may be either on the plus or minus side of the true metabolic rate. In 1924, he suggested[3] the following modification: BMR = 0.75 (PR + 0.74 PP) – 72. With this formula it was found that the basal metabolic rate could be predicted within 10 per cent of the actual value in slightly over half the cases.

In 1926, Cameron, Kitchen and MacRae[4] concluded that, though in most cases, especially in normal persons, the actual basal metabolic rates and those estimated from pulse pressure and pulse rate agree closely, the exceptions are sufficiently numerous, with variations in both directions, to prohibit reliance being placed on these data. In 1929, Langmead[5] reported the experiences of Dr. T. C. Hunt with Read's formula. In 27 of 50 cases (an incidence of 54 per cent) actual basal metabolic rates and those estimated from pulse pressure and pulse rate agreed within ten points, and the observation was made that the calculated values will seldom give appreciably too high an estimate of the basal metabolic rate; they will often give slightly lower values. A very marked discrepancy between actual and calculated values suggests an error in technique. In the sixth edition of their book, "Recent Advances in Medicine", Beaumont and Dodds[6] still recommend Read's method of estimating basal metabolism. According to the experiences of these authors, the figure obtained usually corresponds fairly closely with the basal metabolic rate actually estimated. In 1931 Gale and Gale[7] suggested the following formula: BMR = (PR + PP) – 111. With this very simple equation, the basal metabolic rate was predicted with an error not more than 5 per cent in 27.5 per cent of the cases studied; with an error not more than 10 per cent in 45.6 per cent of cases; and with an error not more than 15 per cent in 57.6 per cent of cases. In 1932, Jenkins[8] suggested the following formulæ: for males; 0.534 PR + 0.436 PP – 59.95; for females; 0.497 PR + 0.368 PP – 57.42. It is of interest to note that practically the same proportionate weight is given to pulse rate and pulse pressure as in Read's formulæ. Recently, Read and Barnett[9]

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reported their experiences with the following formulæ: For men, Cal. per sq.m. per hour = $\frac{(PR)\ (PP)}{200} + 27$. For women, Cal. per sq.m. per hour = $\frac{3\ (PR)\ (PP)}{700} + 24$. With these formulæ a high correlation coefficient was observed; it was slightly over 0.8 for both men and women.

Theoretically, at least, the use of pulse pressure and pulse rate in order to predict basal metabolic rate appears to be sound. An increase of basal metabolism implies an increased consumption of oxygen, and this increase is obtainable in three ways only, namely, (*a*) by an increase of oxygen unsaturation of the blood; (*b*) by an increase of circulation rate; or (*c*) by a combination of (*a*) and (*b*). Except in heart failure and in artificially induced slowing of circulation, it is doubtful whether an increased demand of oxygen, unless it is very marked, is usually met by increased oxygen unsaturation of the blood. This observation is based upon data obtained by the writer[10] in a study of diabetic acidosis. This study involved the measurement of differences between the oxygen contents of arterial and venous blood. The differences noted fluctuated within very narrow limits, in spite of increase of metabolism. Greater differences have been reported, but the writer has as yet failed to find them when the necessary conditions[11] for the collection of venous blood from the arm were strictly adhered to. Even in hyperthyroidism, where the increase of metabolism may be much greater than in diabetic acidosis, and where some slowing of circulation due to heart failure is not uncommon, the differences between the arterial and venous oxygen contents, though greater than the normal, were still found to fluctuate within fairly narrow limits.[12*]

Assuming that an increased demand of oxygen is not, as a rule, met by increased oxygen unsaturation of blood, the only other means of increasing oxygen supply is increase of circulation rate. That circulation rate is increased with increase of basal metabolism has been demonstrated repeatedly, though, as Douglas and Haldane[14] have shown, the increased blood supply may not be a simple linear function of the increased metabolism. Davies, Meakins and Sands[15] showed that the minute volume of the heart in hyperthyroidism was increased in proportion to the rate of metabolism. Stewart[16] demonstrated an increase of blood flow in the hand. Clinically, such phenomena as polyuria and sweating alone suggest an increase of blood supply.

Increase of circulation rate may be accomplished by an increase of pulse rate (heart beat) by an increased output of the heart per beat, or both. It has been known for a long time that the pulse rate is roughly proportional to the increase of metabolism. This subject is fully discussed by Harris and Benedict in their monograph.[17] Benedict and Carpenter[18] have demonstrated that the intimate relationship between pulse rate and energy expenditure which is found in the normal resting subject also applies to severe muscular work. Proportionality between pulse rate and rate of metabolism has been repeatedly observed in hyperthyroidism.[19 to 23]

Increase of blood pressure is a fairly constant finding with increase of metabolism. An increase of systolic pressure is common,[24, 25] but more striking is the increase of pulse pressure. The latter, as Boothby[26] has pointed out, when found in association with an increase of pulse rate, may be taken as an indication of an elevated basal metabolic rate. Beall[27] considers a pulse pressure of more than 50 millimetres suggestive of hyperthyroidism. Davies and Eason[21] have very clearly demonstrated the parallelism between pulse pressure and the metabolic rate in hyperthyroidism. The combination of increased pulse pressure and increased pulse rate is practically pathognomonic of exophthalmic goitre. Harris[28] first made the important observation that this unusual combination of conditions is observed in hyperthyroidism alone. In any other condition (heart failure, administration of atropine, amyl nitrite, etc.) a rapid pulse is usually accompanied by a decrease of pulse pressure.

According to the above observations, it is

* With more marked slowing of circulation, such as in advanced heart failure, or that artificially induced by drugs, the difference between the oxygen contents of arterial and venous blood may, of course, be quite marked. In heart failure, the writer[13] found it as high as 10 volumes per cent and more. Following the administration of dinitrophenol[11] the difference may also be quite high. It is of interest here to note that one of the striking effects of this type of drug, and thus differing from all other known metabolic stimulants, is increase of metabolism without increase of pulse rate.

obvious that there are a number of conditions which are roughly proportional to the rate of metabolism. Proportionality does not, however, necessarily imply causal relationship. As Du Bois[29] has pointed out there are so many conditions which are roughly proportional to the basal metabolic rate that one must not assume that the relationship is causal merely because they may be represented by similar curves. Further, in spite of the parallelism noted frequently between the pulse rate and the rate of metabolism, the vagaries of the pulse rate are sufficient to limit the value of this simple clinical measure of metabolism. This is due to the fact that, as stated, the body has recourse to another method of increasing circulation rate when the demand for oxygen is increased, namely, increase of the output of the heart per beat. As a matter of fact, as Barcroft[30] has shown, in certain circumstances, the minute volume of blood may actually be increased with a decrease in the pulse rate. Dinitrophenol is a more recent illustration. Since this drug has the effect of increasing the rate of metabolism without increasing the pulse rate, and since it may not increase the oxygen unsaturation of the blood in spite of the increase of metabolism, the increased demand for oxygen must be met at times by increasing the output of the heart per beat.

The many vagaries of pulse rate and pulse pressure account largely for the different correlation coefficients which have been observed between pulse pressure and metabolic rate and pulse rate and metabolic rate. Since pulse rate may increase without increase of pulse pressure, and since pulse pressure may increase without increase in pulse rate, the use of both measures of rate of metabolism would obviously be more reliable than any one alone. Murlin and Greer,[31] in 1914, first made the observation that the product of the pulse rate and pulse pressure is a better indication of the level of metabolism than the rate alone. That the product of pulse rate and pulse pressure reflects the velocity of blood flow was suggested as early as 1904 by Erlanger and Hooker.

Shortly after Read's formula was published in 1922, the writers tested this method of predicting basal metabolism. Two hundred patients were investigated. The selection of cases was random, except that it was confined to patients who had been subjected previously to basal metabolism tests and whose cooperation could be depended upon. In each case, the past records showed that the tests were "satisfactory"—the patients were quiet throughout the tests; the breathing was regular in rate and rhythm; and the uniformity of the pulse rates before, during, and after the tests suggested absence of appreciable psychic disturbances. In each case, our routine procedure for determining basal metabolism was strictly adhered to. All tests were performed in the morning and at least fifteen hours after the last meal. No water was allowed during this period prior to the test. In each case, the subjects were at complete rest in the recumbent position for at least one hour before the test. Careful attention was paid to any movements of the head, hands and feet. All the tests were performed by the same technician (K.W.), who was thoroughly familiar with the vagaries of this type of work. All blood pressure readings were also made by the same technician. Readings were made as rapidly as was compatible with accuracy. This tended to reduce to a minimum the artificial increase of systolic pressure which may result from the disagreeable sensation of vasomotor disturbances while the arm is under compression. In order to estimate pulse pressure the diastolic pressure in each case was assumed to correspond to the fourth phase of the blood pressure cycle. To avoid misunderstanding of terminology, the following is our accepted classification of the different phases:

Phase	*Phenomenon*
First	First tap which is heard when the arm-band is released.
Second	Appearance of systolic murmur.
Third	Disappearance of systolic murmur.
Fourth	The point at which the sounds suddenly diminish in intensity.
Fifth	The point at which the sounds cease.

In each case, in order to avoid disturbing the patient, the basal metabolism was first determined. After a rest period of five minutes a sufficient number of blood pressure readings was made to ensure accuracy. Five minutes later the basal metabolism was again determined. After a rest period of five minutes, blood pressure readings were again made. Finally, after another rest period, the basal metabolism was again determined. All basal metabolic rate determinations were made with the Benedict-Roth

apparatus, and calculations were based upon the Du Bois standards. Actual basal metabolic rates were then compared with those predicted from pulse pressure and pulse rate with the above mentioned formula (BMR = 0.683 (PR + 0.9 PP) – 71.5). The formula used for the comparison of data was as follows:

$$\frac{\text{Calculated BMR}}{\text{Actual BMR}} \times 100$$

The arithmetical mean of the 200 ratios of calculated to actual basal metabolic rate was 105.2. In other words, the basal metabolic rates of this group of 200 persons were predicted with an average error of about 5 per cent.

The observation that the basal metabolic rates in these 200 cases investigated were predicted with an average error of about 5 per cent is a statistical conclusion. It, therefore, may or may not, and need not necessarily, apply to the individual. It should also be observed that averages alone have very limited significance, unless they are based upon many observations. The true significance of an average however, may be judged by its probable error, but to those not familiar with the theory and application of probable error, the best method perhaps of demonstrating the limitations of the above method of predicting basal metabolism is shown in Table I, in which the 200 cases are

TABLE I

SHOWING DIFFERENCES BETWEEN ACTUAL BASAL METABOLIC RATES AND THOSE CALCULATED WITH THE FORMULA BMR = 0.683 (PR + 0.9 PP) – 71.5
(200 Observations)

Differences between predicted and actual rates (per cent)	*Number of cases*	*Per cent*
0 – 5	63	31.5
6 – 10	49	24.5
11 – 15	37	18.5
16 – 20	20	10.0
21 – 25	16	8.0
26 +	15	7.5

divided according to the differences between the calculated metabolic rates and those actually observed. The differences are expressed as percentages. It will be noted that the basal metabolic rates were predicted with the above formula within 5 per cent in 63 cases, an incidence of about 31.5 per cent; within 10 per cent in 112 cases, an incidence of about 56 per cent; within 15 per cent in 149 cases, an incidence of approximately 75 per cent; and within 20 per cent in 169 cases, an incidence of approximately 85 per cent. These results, it will be noted, agree very closely with those reported by Read.[2] That this agreement was not accidental is suggested from the following observations.

In their study of disturbance of thyroid function, Davies and Eason[21] in 1924 reported 150 observations of pulse pressure, pulse rate and basal metabolic rate. According to the description of the conditions under which the observations were made, the data are comparable with those obtained in our above-mentioned 200 cases. For comparative purposes, therefore, basal metabolic rates were calculated from the data given by Davies and Eason and compared with the actual rates observed by these authors. The results are shown in Table II. It will be noted that by subjecting the

TABLE II

SHOWING DIFFERENCES BETWEEN ACTUAL BASAL METABOLIC RATES AND THOSE CALCULATED WITH THE FORMULA BMR = 0.683 (PR + 0.9 PP) – 71.5

Differences between predicted and actual rates (per cent)	*Number of cases*	*Per cent*
0 – 5	51	34.0
6 – 10	31	20.7
11 – 15	30	20.0
16 – 20	14	9.3
21 – 25	6	4.0
26 +	18	12.0

(From 150 observations of pulse rate and pulse pressure made by Davies and Eason: *Quart. J. Med.*, 1924, **18:** 36.)

pulse rate and pulse pressure data given by Davies and Eason to the same calculations as our data the results were practically the same; the basal metabolic rate was predicted with no more than a 5 per cent error in 51 of the 150 records, an incidence of about 34 per cent; with an error of between 0 and 10 per cent in 82 cases, an incidence of 54.7 per cent; with an error of between 0 and 15 per cent in 112 cases, an incidence of 74 per cent; and with an error of between 0 and 20 per cent in 126 cases, an incidence of 84 per cent.

The remarkable parallelism between these two groups of data, obtained independently, warranted a further investigation of this method of measuring basal metabolism. A similar study was therefore made of all of the above-mentioned formulæ. The combined results of the two groups of cases are shown in Table III. It will be noted that, with two

TABLE III

SHOWING MEAN RATIOS OF CALCULATED TO ACTUAL BASAL METABOLIC RATES ACCORDING TO DIFFERENT FORMULÆ

Formula	*Our data*	*Davies and Eason's data*
Read (1922)	105.2	106.5
Read (1924)	106.2	107.5
Gale (1931)	107.6	114.7
Jenkins	92.9	92.3
Read (1934)	108.2	111.8

exceptions only, the average basal metabolic rates of the two groups of cases were predicted with an average error of less than 10 per cent. Again to demonstrate the reliability of these formulæ without the use of probable errors each group of cases was divided according to the differences between the predicted and actual metabolic rates. The differences and their incidences are shown in Table IV. These data clearly show that, regardless of the beat was decreased in an appreciable number of cases. That metabolic rate alone was not the influencing factor was shown by a comparison of the data with those obtained in patients suffering from severe diabetes with acidosis and in whom the average basal metabolic rate was approximately the same as in the case of hyperthyroidism.

Since disturbance of heart function is common in hyperthyroidism, and since this disturbance tends to cause an increase of pulse rate, it appeared that herein may be found an explanation of the fact that the basal metabolic rate can be predicted from pulse pressure and pulse rate in about half of the cases only. It is of interest to note that in most cases the calculated metabolic rate tends to be *higher* than the actual. The possibility that heart failure may be a disturb-

TABLE IV.

SHOWING DIFFERENCES BETWEEN CALCULATED AND ACTUAL BASAL METABOLIC RATES AND THEIR INCIDENCES

Differences between calculated and actual basal metabolic rates

Formula		*No. of cases*	*0-5*		*6-10*		*11-15*		*16-20*		*21-25*		*26+*	
			No.	*Per cent*	*No.*	*Per cent*	*No.*	*Per cent*	*No.*	*Per cent*	*No.*	*Per cent*	*No.*	*Per cent*
Read (1922)	MGH*	200	63	31.5	49	24.5	37	18.5	20	10.0	17	8.5	14	7.0
	D.E.†	150	51	34.0	31	20.7	30	20.0	14	9.3	6	4.0	18	12.0
Read (1924)	MGH	200	64	32.0	50	25.0	29	14.5	23	11.5	16	8.0	18	9.0
	D.E.	150	44	29.3	32	21.3	34	22.7	12	8.0	8	5.3	20	13.3
Gale	MGH	200	56	28.0	39	19.5	41	20.5	26	13.0	14	7.0	24	12.0
	D.E.	150	35	23.3	24	16.0	20	13.3	15	10.0	17	1.1	39	26.0
Jenkins	MGH	200	53	26.5	55	27.5	50	25.0	23	11.5	12	6.0	7	3.5
	D.E.	150	30	20.0	30	20.0	30	20.0	29	19.3	13	8.7	17	11.3
Read (1934)	MGH	200	56	28.0	60	30.0	34	17.0	26	13.0	14	7.0	9	4.5
	D.E.	150	36	24.0	34	22.7	18	12.0	21	14.0	10	6.7	31	20.7

*MGH—The Montreal General Hospital.
†D.E.—Davies and Eason.

formula used, the basal metabolic rates were predicted with an average error of less than 10 per cent in about one-half of the cases only. An attempt was, therefore, made to determine the cause of failure with the other cases.

As stated, a number of conditions other than the rate of metabolism may affect the pulse rate. Heart failure is one of these, and, as is well known, damage to the heart muscle is common in hyperthyroidism. This has been demonstrated repeatedly, both clinically and pathologically, and also experimentally. In 1926, Rabinowitch and Bazin[12] found that in hyperthyroidism the output of the heart per

ing factor was, therefore, investigated as follows.

It is a well recognized fact that, in general, the more marked the thyrotoxicosis, the greater is the probability of heart failure. That, as a rule, there is some parallelism between the degree of thyrotoxicosis and increase of basal metabolism is also well recognized. An attempt was, therefore, made to determine whether separation of cases with respect to the rate of metabolism would increase the accuracy of predicting basal metabolism with the above-mentioned formulæ. All cases were, therefore, divided into two groups, namely, (a) those with

basal metabolic rates of + 40 per cent or more, and (b) those with basal metabolic rates of less than + 40 per cent. The choice of + 40 per cent as the dividing line was purely arbitrary. The effects of this division upon the difference between calculated and actual basal metabolic rate are shown in Table V.

TABLE V

SHOWING THAT SEPARATION OF CASES WITH RESPECT TO RATE OF METABOLISM DOES NOT INCREASE ACCURACY OF PREDICTING BASAL METABOLISM

$$\frac{\text{Calculated BMR}}{\text{Actual BMR}} \times 100$$

		M.G.H. data*	*D.E.** data*
Read (1922)	All data	105.2	106.5
	BMR < 40%	106.0	110.2
Read (1924)	All data	106.2	107.5
	BMR < 40%	108.0	111.9
Gale	All data	107.6	114.7
	BMR < 40%	108.1	114.1
Jenkins	All data	92.9	92.3
	BMR < 40%	95.7	98.1
Read (1934)	All data	108.2	111.8
	BMR < 40%	108.0	112.8

* M.G.H.—The Montreal General Hospital.
** D.E.—Davies and Eason.

Again, the basal metabolic rates calculated from the pulse rate and pulse pressure data given by Davies and Eason were used for comparison. It will be observed that, according to the average values, excluding the basal metabolic rates of + 40 per cent and over did not increase the accuracy of predicting basal metabolism. Again, to dispense with probable errors, the data are given in greater detail in Table VI. Here, however, in view of the remarkable similarity of results, all the data (Davies and Eason and our own) are combined. It will be observed that by excluding the high metabolic rates it was still possible to predict the basal metabolic rates in about half of the cases only. The results of this investigation, therefore, confirm in general the observation of Cameron, Kitchen and McRae, that though actual and predicted values agree closely in most cases, the exceptions are sufficiently numerous to prohibit the use of pulse rate and blood pressure as an index of the basal metabolic rate. This method of predicting rate of metabolism, however, has its uses, and this applies particularly to general practice. As stated previously, with very few exceptions, the ideal conditions necessary for basal metabolic rate determination are obtainable in well conducted laboratories only. In the opinion of

TABLE VI.

SHOWING THAT SEPARATION OF CASES WITH RESPECT TO BASAL METABOLIC RATES DOES NOT INCREASE THE ACCURACY OF PREDICTING BASAL METABOLISM

Differences between calculated and actual basal metabolic rates

Formula	*Type*	*Total No.*	*0-5*		*6-10*		*11-15*		*16-20*		*21-25*		*26+*	
			No.	*Per cent*	*No.*	*Per cent*	*No.*	*Per cent*	*No.*	*Per cent*	*No.*	*Per cent*	*No.*	*Per cent*
Read (1922)	All data	350*	114	32.6	80	22.9	67	19.1	34	9.7	23	6.6	32	9.1
	BMR less than +40%†	302*	101	33.4	65	21.5	56	18.5	31	10.3	24	7.9	25	8.3
Read (1924)	All data	350	108	30.9	82	23.4	63	18.0	35	10.0	24	6.8	38	10.8
	BMR less than +40%	302	89	29.5	73	24.2	52	17.2	32	10.6	21	6.9	35	11.6
Gale	All data	350	92	26.3	63	18.0	57	16.3	44	12.5	32	9.1	62	14.8
	BMR less than +40%	302	77	25.5	51	19.8	52	17.0	44	14.5	25	8.2	53	17.5
Jenkins	All data	350	83	23.7	85	24.3	80	22.8	52	14.8	25	7.1	24	6.8
	BMR less than +40%	302	82	27.1	80	26.5	78	25.8	37	12.2	10	3.3	16	5.3
Read (1934)	All data	350	92	26.3	94	26.8	52	14.8	47	13.4	24	6.8	40	11.4
	BMR less than +40%	302	75	24.8	81	26.8	42	13.9	41	13.6	34	11.2	38	12.6

*Data of Davies and Eason and our own combined.
†All basal metabolic rates of +40% or over are excluded.

the writer, it is doubtful whether basal metabolic rates obtained in office practice with the many forms of apparatus sold for this purpose are reliable in more than half of the cases. This opinion is based upon the writer's many experiences with repeated tests. A 50 per cent accuracy is a very liberal estimate; the use of pulse rate and pulse pressure is a much more reliable procedure. Intelligent use of the above formulæ, however, for predicting basal metabolism depends upon a number of precautions. These are indispensable and cannot be emphasized too much. They are as follows.

1. Blood pressure and pulse rate readings must be obtained under *strictly basal metabolism conditions;* that is, with the patient deprived of food for at least 15 hours before the test; with the patient at *complete rest* for at least one-half hour and in a *comfortable position,* so that movements of any part of the body (hands, feet, etc.) will not be necessary.

2. Readings of the diastolic pressure must be accurate.

3. As with the ordinary method of determining basal metabolism, it is important to exclude the effects of fever.

4. In the interpretation of data, it is also important to exclude conditions other than increase of metabolism which may account for an increase of pulse rate (heart failure, arrhythmia, etc.) and of pulse pressure (aortic regurgitation, etc.).

5. Since the procedure is simple, at least four or five observations should be made, with reasonable periods of rest between each observation, because of the possible disturbances due to the discomfort of blood pressure apparatus. A thorough examination, however, requires less than an hour—the usual time necessary for proper determination of basal metabolism with the ordinary methods.

Aside from immediate practical application, prediction of basal metabolism from pulse pressure and pulse rate may have other uses. Since the method depends upon the intimate relationship between pulse rate, pulse pressure and circulation rate, this procedure may be an indirect means of determining circulation rate, when combined with determination of the oxygen unsaturation of blood. With very few exceptions it may be assumed that arterial blood is 95 per cent saturated with oxygen. This simplifies the procedure. Examination of venous blood only is necessary, and the latter is readily obtainable. As stated, it has been shown that when venous blood is obtained from the arm strictly under the conditions described the values are at least in accord with other methods of measuring circulation rate in man. This, of course, is not an absolute measure; it is a relative measure of circulation; but, as was previously suggested, the value obtained bears the same relation to the true circulation rate as the oxygen content of venous arm blood bears to the oxygen content of the mixed venous blood entering the lungs. The absolute value of circulation rate may be expressed as the product of the relative value and a constant. The possibility of the use of this procedure is now being investigated.

SUMMARY

Theoretically, the use of pulse rate and blood pressure as an index of basal metabolic rate is sound. Practically, it is possible to predict the rate of metabolism with a reasonable degree of accuracy in about 50 per cent of cases only. This method of predicting metabolism, however, has its uses clinically. It is not suggested as a substitute for direct determination of basal metabolic rate; it should not be used whenever direct determination is available. Accurate determination, however, is possible, with very few exceptions, only in well-conducted laboratories. Determined elsewhere, it is doubtful whether the test is of any value. Pulse rate and blood pressure data, therefore, may be useful, but, as stated, only when obtained under the conditions described.

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THE PROGNOSTIC VALUE OF RENAL FUNCTION TESTS IN PULMONARY TUBERCULOSIS*

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ANY procedure which will aid in the prognosis of pulmonary tuberculosis would seem worthy of attention. In this connection the significance of renal function tests has been studied in a series of cases, during the past three and one-half years, at the Mountain Sanatorium. On each patient the following tests were done. (1) Two-hour, (2) Water, (3) Concentration. The tests were carried out according to the methods described by Sanford and Todd. The methods are described briefly here.

For the two-hour test ordinary meals are eaten at 8 a.m., 12 noon and 5 p.m. All the urine voided between 8 a.m. and 8 p.m. is collected every 2 hours, beginning at 10 a.m., and each specimen is measured for specific gravity and volume. All the urine voided between 8 p.m. and 8 a.m. the next morning is collected as one specimen and its specific gravity and volume noted. No fluids or food are allowed between meals or during the night of the test, but during the day, with meals, the patients take 1,500 to 1,700 c.c. of water or other fluids.

For the water test no breakfast is eaten, but the patient drinks between 8 and 8.15 a.m. 1,500 c.c. of water, after voiding. Then every half hour from 8.30 to 12 noon all the urine voided is collected as separate specimens, and on each the volume and specific gravity are determined. All the urine voided between 12 noon and 8 a.m. the next day is collected as one specimen, and the same determinations made on it. Dinner and supper with the ordinary fluids for the same are taken, but no fluids or food between meals.

For the concentration test the patient empties the bladder at 8 a.m. and this specimen is discarded. This of course is true of the other tests. Special dry meals are served at the usual times, and no fluids at all are allowed on that day or night. No food is allowed between meals. The urine is collected every 3 hours, beginning at 11 a.m. up to 8 p.m., and for each specimen the volume and specific gravity are determined. All the urine voided from 8 p.m. to 8 a.m. is collected as one specimen and the usual determinations made on it. The meals given are as follows: breakfast at 8 a.m.—dry cereal with sugar, syrup or honey, no milk, one egg, toast or bread with butter; dinner at 12 noon—roast beef, steak or chops, potatoes, one portion (boiled or baked), bread and butter, and jam; supper at 5 p.m.—two eggs, bread and butter, and jam; breakfast next morning—ordinary.

Each test has a type response considered to be within normal limits. In the two-hour test there should be a total output of between 150

* From the Infirmary for the Study of Medical Conditions associated with Pulmonary Tuberculosis, Mountain Sanatorium.

to 300 c.c. less than the intake. The night volume should be less than 450 c.c., or less than one-half of the day volume. There should be a day variation in specific gravity of 6 to 10 points, and the night specific gravity should be 1.018 or more. The variations in specific gravity of day specimens should of course coincide with the variation in the volume due to diuretic response to meals. One specimen in the day should have a specific gravity of at least 1.020.

A normal water-test response implies the following. The total output should be 2,500 c.c., and for the first four hours 1,200 to 1,800 c.c. Some specimen in the first four hours should show a specific gravity of 1.003 or less. The specific gravity of the 20-hour specimen should be 1.016 or more. Individual specimens should show a volume of 200 to 300 c.c.

For the concentration test a normal response means that some specimen, usually the night one, should have a specific gravity of at least 1.030. Also the night volume should be less than one-half the day volume.

Keeping the above values for the normal in mind, it was found, after doing a fairly large series of tests on tuberculous patients, that three conclusions could be formulated. These were: (1) many tuberculous patients showed impairment of function; (2) the impairment seemed rather typical, namely, an impairment of ability to concentrate; and (3) in patients with a temperature of 99.8° or over the typical impairment was not observed.

Obviously, there is a fairly wide range of response within normal limits. Age must be taken into consideration. The tuberculous patient of 52 years may, in my experience of the past few years, give quite as good a response as the patient aged 20. In most cases, however, he does not. For example, although a specific gravity of 1.030 is mentioned as the minimal normal for one specimen of the concentration test, yet most of our patients between 18 and 38 years of age could concentrate to 1.030 up to 1.036. When a senile arteriosclerotic concentrated to 1.028 I considered that a good response. Among older patients, from 40 to 57 years of age, night volume in the two-hour test was occasionally increased to more than one-half the day volume. In such cases, of course, the specific gravity of the same specimen tended to be lower than 1.018. In many of these cases, however, on doing the other two tests, good specific gravities were found in the 20-hour specimen of the water test and in the concentration test.

In this study renal function tests were done on 90 patients, all having pulmonary tuberculosis. This total number is divided into groups.

Group I, comprised those with no fever in most cases (in a few cases a daily evening rise of temperature to 99°, but no higher), and there was neither diarrhœa nor constipation. Blood pressure was normal and there was no albuminuria. No abnormal microscopic findings were obtained in centrifuged urine; *i.e.*, more than 2 to 5 white blood cells per high power field, no granular casts, but an occasional hyaline cast. In persons 50 years or over a very infrequent erythrocyte and a rare granular cast was allowed as a normal finding. In patients in the neighbourhood of 50 years or over, who showed definite evidence of generalized arteriosclerosis, an occasional trace of albumin and frequent hyaline and occasional granular casts were not considered abnormal in our series. In such arteriosclerotics one red blood cell in 3 or 4 high power field was allowed.

Group I is the main group, comprising 80 patients, and is subdivided into rather arbitrary age-groups, not necessarily justified in theory, but I think certainly justified from the test responses. In other words, among patients, say from 40 to 50 years of age, while test responses might be fully equal to those of much younger people yet in most cases they had had the disease longer, and hence I accepted for older people a slightly lower standard of normal for the test responses.

The patients comprising Group I were subdivided into the following arbitrary age groups: (1) 18 to 38 years; (2) 39 to 46 years; (3) 47 to 57 years. For each age group the type of response was classified as good, fair and poor, or A, B, C, respectively. Below is given an explanation of what was considered to be the type of response typical of A, B, or C, for each age group.

For the age group, 18 to 38, type A response to the renal function tests as outlined above is as follows. In the two-hour test the specific gravity of the night specimen should be 1.018 or more; in the vast majority of our cases it was over 1.020. The specific gravity of the 20-hour specimen of the water test should be 1.018 or over; in most of our cases it was 1.020

or over. For the concentration test one specimen at least should be 1.028 or over; usually it is 1.030 or over.

For the same age group a type C response implies a definite impairment of response in one or more of the tests. The following criteria should distinguish type C: (1) a specific gravity in the concentration test of 1.025 or less; (2) A concentration test figure of 1.027 or less, together with a specific gravity of the 20-hour specimen in the water test of 1.013 or less. In either of the above cases impairment of water excretion is often shown by an increase in the night volume in the two-hour test.

For the age group, 39 to 46 years, a type A response implies that the concentration test produces one specimen with a specific gravity of at least 1.028; usually it is 1.030 or over. The specific gravity of the 20-hour specimen in the water test should be at least 1.016. A few cases were included where the specific gravity of this specimen was only 1.014, but in these the concentration test produced a specific gravity of 1.030 to 1.038. In this age group, particularly at 44 to 46 years, one may find in the two-hour test that night volume closely approximates day volume, with a specific gravity in the former of 1.016 or more.

In this age group I found considerable difficulty in distinguishing between varying degrees of impaired response granted that the type was not a type A. The type C response is therefore interpreted when the highest specific gravity obtained in the concentration test is not over 1.025. In addition there must be no higher a specific gravity for the 20-hour specimen of the water test than 1.014.

For the age group, 47 to 57 years, a type A response means that the specific gravity of one of the specimens in the concentration test be 1.028 or more, and for the 20-hour specimen of the water test 1.012 or more. There may be moderate increase in the night volume with a decrease in specific gravity in the two-hour test. A type C response in the age group 47 to 57 years implies a marked impairment in all the test responses. Thus, although there may be a specific gravity as high as 1.026 for one specimen in the concentration test, yet the specific gravity of the 20-hour specimen in the water test may be below 1.012, and, in addition, the night specimen in the two-hour test will not have a specific gravity higher than 1.014. The picture is one of general impairment.

In each age group those responses that fall between type A and C were classed as B, though in many instances the differentiation from C was difficult. Type B cases showed impairment or renal function definitely excluding them from type A, but not severe enough to justify their inclusion in type C. The impairment of ability to concentrate was shown by the relatively low specific gravities obtained in the concentration test and in the 20-hour specimen of the water test. In only a few cases were tests repeated on the same patient. In three cases, repeated after a two-year period, two patients showed improvement from C to B, and one showed a fall from B to class C. It is felt that in doubtful cases a repetition of the testing would have given a clearer picture of the patient's condition.

The following table gives examples of the various type responses secured.

TABLE I

		Water test			*Concentration test*			
Case	*Age*	*Total volume*	*20 hour volume*	*Specific gravity of 20 hour specimen*	*Day volume*	*Night volume*	*Best specific gravity*	*Type response*
		c.c.	c.c.		c.c.	c.c.		
1	38	2,340	800	1.020	405	210	1.028	A
2	21	2,475	1,000	1.016	410	230	1.025	B
3	37	2,375	940	1.012	265	160	1.026	C
4	41	2,600	1,260	1.016	410	285	1.030	A
5	45	3,215	1,600	1.010	430	360	1.024	C
6	54	2,370	1,440	1.012	465	200	1.028	A
7	53	2,185	430	1.012	575	50	1.024	B
8	52	2,525	1,570	1.006	630	225	1.026	C
9	52	2,320	885	1.014	580	250	1.032	A
10	38	2,660	1,360	1.020	570	260	1.032	A
11	27	1,725	660	1.020	450	250	1.026	B
12	27	2,205	870	1.021	410	230	1.025	C
13	33	2,345	800	1.021	505	160	1.033	A
14	34	2,400	940	1.010	255	160	1.032	B

The characteristic impairment found in tuberculous patients seemed to be an impairment of tubular water re-absorption. In the typical impairment in our series, the specific gravity of the 20-hour specimen in the water test and of the various specimens in the concentration test was low, even when considered together with some evidence of delayed water excretion. The difference found in response to these tests did not seem to depend on the extent of the lung lesion, the duration of the disease, degree of cavitation, if present, nor on activity, as measured by sedimentation tests. The estimation of the degree of renal function impairment of a tuberculous patient would seem to be a measure of the degree of damage done by the toxæmia resulting from the lung lesion. Some of the more technical tests designed to measure glomerular function might well be done along with the three tests used in this series.

cases in the well-group. "Unimproved" includes those who have become slightly worse, or who are still either totally bedridden, with no obvious change in their condition, or are on very restricted exercise. An important point in regard to the unimproved is that some of them improved slightly but definitely for the first six months after admission. Many of the Group I cases have left the sanatorium, and as accurately as possible their present condition has been checked up by letters to clinics, private physicians, or, where necessary, to the patients themselves. The term "Far Advanced" of course refers to the lung lesion at the time of doing the tests.

The obvious conclusion to be drawn from Table II is the fact that the cases giving A type response do well, and B type next best. Only 4 deaths occurred in the group of 54 type A response, and of these 2 were post-operative deaths following thoracoplasty, and 1 patient

TABLE II

						Present condition											
			Response			*Well*			*Improved*			*Unimproved*			*Dead*		
Age	*No.*	*Far Adv.*	*A.*	*B.*	*C.*	*A.*	*B.*	*C.*	*A.*	*B.*	*C.*	*A.*	*B.*	*C.*	*A.*	*B.*	*C.*
18 to 38	52	41	37	11	4	32	3	1	3	5	1	0	3	0	2	0	2
39 to 46	15	14	11	3	1	7	2	0	3	0	0	0	0	0	1	1	1
47 to 57	13	13	6	2	5	5	0	0	0	2	0	0	0	1	1	0	4
Totals	80	67	54	16	10	45	5	1	6	7	1	0	3	1	4	1	7

The term "Well" implies that the patient is on increasing exercise and has shown considerable improvement clinically and by x-ray of chest. Some of these people did poorly for the first six months after admission. "Improved" implies some clearing of disease by x-ray evidence, together with a general clinical improvement, but not to the same extent as the

died of tuberculous meningitis two months after the tests were done. For the one remaining death I have no explanation to offer for the discrepancy between the response and the fatal issue. Table III gives a list of the 12 deaths occurring in Group I.

In Table III "Duration of Disease" means of course previous to test date, and the term

TABLE III

			Duration of disease		
Case	*Age*	*Response*	*Prior to test*	*After test*	*Cause of death*
1. (F)	27	B	2 years	14 months	Pulmonary tuberculosis
2. (W)	45	C	1 year	1 year	" "
3. (Mc)	52	C	14 years	1 year	" "
4. (Mc)	47	C	4 years	2 years	" "
5. (D)	25	A	3 months	2½ years	" "
6. (M)	33	B	6 months	2 years	" "
7. (Q)	33	A	11 years	2 months	Tuberculous meningitis
8. (D)	48	B	4 years	1 year	Pulmonary tuberculosis
9. (R)	38	C	18 years	2 years	" "
10. (M)	53	A	6 months	1 year	Post-operative complication
11. (O)	44	A	1 year	10 months	" " "
12. (W)	54	C	12 years	2½ years	Amyloid disease

"interval" means the time elapsing between the date of the tests and death. All the patients had the x-ray classification of far-advanced disease; so did the majority of Group I, who are now well. Under "Cause of Death" one should state that, with the exception of the 2 patients who died after operation and the one who developed meningitis, the remaining 9 all showed extension of lung disease for from six months to one year before death. Four of the 12 died outside the sanatorium. No autopsies were performed on these. Of the remaining 8 autopsy was done on 5, numbers 8 to 12 inclusive.

Cases 10 and 11 merely illustrate that a type A response loses its prognostic significance in the presence of some intervening factor, such as post-operative complication, and also, of course, fatal hæmorrhage, or the sudden onset of tuberculous broncho-pneumonia. Patient 12 had pyopneumothorax as a complicating factor, and he showed albuminuria for a few months before death. The post-mortem findings showed definite renal changes in cases 8, 9, and 12 only. In 8 and 9 the changes were degenerative ones; case 12 showed chronic nephritis in addition.

Group II comprises those patients who all had far advanced disease, normal urinary findings, but had fever of from 100 to 101°.

TABLE IV

			Water test			*Concentration test*		
Case	*Age*	*Temperature*	*Total volume*	*Volume 20 hours*	*Specific gravity of 20 hours*	*Day volume*	*Night volume*	*Best specific gravity*
			c.c.	c.c.		c.c.	c.c.	
1. (V)	23	100°	1,690	1,115	1.012	335	220	1.032
2. (M)	19	100°	1,765	500	1.026	285	180	1.038
3. (G)	40	100°	3,115	1,420	1.020	490	310	1.034
4. (S)	29	101°	1,690	810	1.013	270	185	1.026
5. (W)	24	101°	2,230	900	1.026	390	175	1.030

Obviously from such a small series no conclusions can be drawn, other than to point out the high specific gravity obtained in these patients, all obviously ill and who all died nine to eighteen months after the date of doing the tests. Post-mortems were performed in cases 1, 2 and 5. In these cases the findings were degenerative kidney changes (nephrosis).

In Table III, cases 8 to 12 inclusive came to post-mortem. Of these, 2 were post-operative deaths, and at autopsy showed no definite kidney lesion. In Table IV cases 1, 2, and 5 came to post-mortem. Case 12 in Table III showed at autopsy, two and one-half years after the date of tests, chronic interstitial nephritis and amyloid disease of the kidney. This patient for several months before death showed albuminuria and had a moderate number of granular and many hyaline, with an occasional waxy cast in the urine. The other cases in Tables III and IV showed: (1) marked cloudy swelling of the tubules, chiefly the proximal convoluted tubules; (2) fatty degeneration of the tubules; and (3) chronic passive congestion. These findings were present in varying degrees for the individual case. In addition, two cases showed microscopic tubercles in the kidneys.

In brief, then, chronic nephrosis was the renal lesion found in patients dying of pulmonary tuberculosis. The renal changes found seemed to affect the proximal convoluted tubules chiefly. In all the fatal cases those patients who ran a long non-febrile course previous to the terminal stage showed a definite impairment of renal function one to two years previous to death.

Group III comprises 5 patients who had far advanced pulmonary tuberculosis, and who died 9 months to 2 years from date of tests. All showed abnormal urinary findings that may be summarized briefly by saying that albuminuria and the presence of casts was relatively great compared with the number of red blood cells present. All showed definitely impaired renal function. Post-mortems were done on four of the five. All showed degenerative renal lesions and one in addition, showed chronic nephritis. There was one case of pyonephrosis. These cases in their investigation, including renal function tests and blood chemistry, are too few in number as yet to form a serial study.

Chronic cases of pulmonary tuberculosis which are being considered for gold therapy or

thoracoplasty at the Mountain Sanatorium are now routinely submitted to renal function tests. It is hoped shortly to do these tests on all patients just before discharge. This routine is definitely intended to be used as an added means of prognosis in such cases, not merely as part of general investigation. It is hoped in time to more accurately define the limits of the various type responses.

The essential post-mortem data which I have presented were drawn from the complete autopsy reports prepared by Dr. Stanbury.

CONCLUSIONS

1. Patients with pulmonary tuberculosis who subsequently die or are unimproved over a period of one to two years show a typical impairment of renal function.

2. In cases of chronic pulmonary tuberculosis with little or no obvious activity, and which differ widely as regards the subsequent course of the disease, the response to renal function tests gives an accurate prognosis as to recovery or a fatal ending.

3. The impairment of function is a measure of the damage done by the tuberculous toxæmia.

4. This impairment is not directly proportionate to the extent or duration of the lung lesion, nor to the present degree of activity.

5. In making a prognosis on the basis of renal function test responses it is essential to do "repeat" tests in two types of patients. In both cases the disease is of short duration, but in the first the onset is insidious and in the second the disease has run an acute, febrile course. The initial test in the first case may show a good response and a poor one in the second.

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RECENT DISCOVERIES IN THE PATHOLOGY OF THE NASAL AND AURAL MUCOSA*

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"IT is in vain to speak of cures, or think of remedies, until such time as we have considered of the causes" — thus Robert Burton renders Galen's ancient precept.[1] The search for causes has led many experimenters to attempt demonstration of the truth of preconceived theory, but Claude Bernard long ago pointed out that "il faut modifier la théorie pour l'adapter à la nature, et non la nature pour l'adapter à la théorie."[2] Bernard Shaw performed a salutary, if somewhat irritating, service for us, well before the World War, by disclosing the contrasts between daily clinical practice and modern laboratory research as the horns of the doctor's dilemma. The lapse of time has intensified the demands of specialization, and has, also, taken away from us blind faith in Virchow's pathology from the fixed and stained section, as well as in Ehrlich's mechanistic devices to explain serum immunity. Bacteria have been found to show various appearances and habits of growth in the body widely differing from their behaviour *in vitro;* and from sinus lesions, formerly ascribed to one race of germs, a dozen different sorts have been isolated. Sinus mucosa, shown under lipiodol to be thickened and œdematous today, may at operation to-morrow have returned to its normal thickness. Since bacterial theories and serological systems are thus subject to change, the only constant factor in bodily immunity is the living tissue cells.

Natural immunity is inherited from our parents, but with the first breath and the first milk we are subjected to outside influences

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which start up the complex "emergency mechanism"[3] of acquired immunity. Circulating antibodies are elaborated to resist microbes and their toxins, and begin to circulate in the blood. However, in allergic persons, where cellular reaction, ranging from hay-fever to asthma and urticaria, is most extensive, circulating antibodies are not found. Gay ascribes natural or innate immunity to the activity of the polymorphonuclear leukocytes of the circulating blood. Acquired immunity arises from the reaction products against bacterial exposure which accumulate in the blood serum. But certain diseases—chicken-pox and typhoid, for example—set up immunity neither by polymorphonuclear activity nor by the action of antibodies; thus one is forced to explain certain phases of immunity through the properties of the fixed tissue cells of the body.[4] Reuben Kahn recently secured the annual award of the American Association for the Advancement of Science through his study of the immune reactions of specific body cells, determining that the skin is ten times more active in immunization than is the blood, and that its "reaction" by redness when inoculated is an index, not of its sensitiveness but of its ability to localize and limit infection to that area.[5]

Through the sympathetic system, which W. B. Cannon calls the "interofective" mechanism, a constant film of saline solution or mucus is maintained within our body cavities and passages.[6] The protective layer of cells is maintained within this "fluid matrix", not solidly set like bricks in mortar, but with each cell free, elastic, mobile, and rounded—in Mosher's words, "a sight never to be forgotten" when seen in vital culture while the ciliated membrane remains active.[7]

Extrinsic factors affecting mucosal cells include: the chemical and serological composition of the blood, mucus, serum, and other elements comprising the "fluid matrix"; nerve connections and their electric charge; local and general warmth; humidity; air and gaseous pressure. Intrinsic factors include: the type of cell, in accordance with its inherited constitution; the proportion of nucleus to cytoplasm; its location; nerve endings; ability to absorb foreign matter; properties of changing function, form and volume under diverse stimuli; capacity for multiplication and regeneration to fill up wounds or altered regions. Study of all these variable factors is vastly difficult, which is probably why the cytologists are still working in large measure upon the relatively large cells of simple marine animals.

Within recent years the research of Mosher and his pupils, Knowlton in Boston, and McGregor in Toronto, has proved that accessory sinus mucosa tends to regenerate its ciliated epithelium, even its glands, after complete exenteration of the sinus, where conditions for healing are good.[8] Hilding[9] has demonstrated the necessity of a healthy layer of vascular granulation tissue over which the fragile new mucosa must develop. If vascularity is poor fibrous changes are rapid and flattened, or crescentic scars may prevent normal regrowth of ciliated epithelium. When ciliated membranes are exposed to outside air the ciliated cells are replaced by cuboidal and even squamous epithelium. In rabbits, when one nostril was permanently closed, the normally ciliated mucosa became much thinned, and the ciliated cells were nearly all replaced by mucin-containing goblet cells.[9]

Here is an explanation, through altered function, of the epithelial changes and crusting observed after excessive turbinectomy or in ozæna, and, conversely, of degeneration or cyst-formation of the antral walls when the ostium is occluded. Exposure to cold, to irritants, or to fluids removing the normal nasal mucus modifies the underlying mucosa. The moving mucin network changes every ten or fifteen minutes throughout the nose under normal conditions; if it is removed irritants reach the ciliated cells much more readily. Lierle and Moore[10] have recently shown how water, strong cocaine, menthol, thymol and eucalyptol slow ciliary activity; epinephrine, zinc sulphate and mercurochrome are even more harmful; while 0.5 per cent silver nitrate at once and finally destroys ciliary activity.[10] The rapidity of the desquamation and replacement of such epithelial cells is rather surprising. This leads one to the feeling that these cells are not the essential factor in mucosal defense, but that the subjacent vascular connective-tissue layer is by far the more important barrier in these regions.

It has recently been demonstrated that the poor vascularity of sinus membranes decidedly impedes their absorption of various drugs and toxic substances; indeed, a definite tendency

exists to minimize the etiological influence of the sinuses in focal infection. Kistner and N. W. Jones have however demonstrated by the Rosenow stain that streptococci of virulent morphological types may be isolated from the submucosa of numerous cases of coronary disease, and Hurd and Snyder are similarly insistent that "silent" sinusitis, lacking visible evidence of purulent discharge, may carry germs responsible for the continuance of serious arthritis. It must be admitted that the impaired drainage of such sinuses may lead to definite stasis from obstruction of the ostia, but it should also be pointed out that drainage from the sinus lymphatics into the deep cervical glands, down even to the hilus of the lung, has been demonstrated after lipiodol injection, both by Pfahler, of Philadelphia,[11] and Le Mèe, of Paris.[12] This substantiates Mullin's[13] experimental work of 1919, and suggests that absorption may occur from these lymph glands rather than directly from the sinus membranes.

The claims of Jarvis that redness or paleness of the septal mucosa depends upon acidity or alkalinity of the plasma, owing to dietary peculiarities, have been disproved by other investigators, and Jarvis and his collaborators are now seeking explanations for sinus involvement through investigation of basal metabolism, the chloride-iodine balance, the sodium-potassium balance and the glucose tolerance level—a return to the biochemical and physiological approach of earlier investigators.

Dean is convinced that diet alone will not control chronic sinusitis, and demands the eradication of the upper respiratory infection responsible for malnutrition. His pupils have produced experimental eosinophilia of the maxillary membranes by inhibiting ciliary action with alizarin; acidosis inhibits these changes, while alkalosis increases them. Parasympathetic stimulation by pilocarpin intravenously produces eosinophile infiltration, prevented by ephedrin or pituitary solution. Cortin, the lipoid hormone from the suprarenal cortex, was found by Dean and Wenner to restore normal ciliated membranes in suppurative sinusitis in rabbits. Dean and Hetler have recently corroborated the early findings of Dean and Daniels on rats, showing that vitamin A deficiency will produce sinusitis in monkeys; but a vitamin-high, protein deficient, diet will produce both suppurative sinusitis and otitis.[14]

Sewall's early reliance upon the type of cells found in centrifuged wash water from the antra is somewhat vitiated by the fact that he ignored the presence of connective-tissue elements which possess phagocytic powers, looking mainly for epithelial cells, round cells or polymorphonuclears. The prognostic value of the presence of many polymorphonuclears in the wash water as indicating an acute infection, and of lymphocytes during repair or change to chronic conditions, is now admitted.

The connective-tissue stroma of the sinus wall thickens greatly when irritated. This thickening comes from increased vascularity, with mobilization of histiocytes, (phagocytic fixed cells of connective tissue) some of which are always latent in these membranes, while others arrive from the capillaries by diapedesis. These cells are found in the granulation tissue of wounds; they take up the rôle of absorbing foreign matter or bacteria which penetrate the ciliated epithelium. After this work is done the histiocytes either die and are carried off with their load by the pericapillary lymphatics, pass into the lumen of the cavity, or are transformed into fibrocytes, which help to build up solid fibrous repair. According to the nature and virulence of the irritating agent, the histiocytes receive the aid of polymorphonuclears and lymphocytes from the circulating blood.

Eosinophiles are specifically attracted to the tissues by certain protein or chemical stimulants, notably plant and animal allergens, and the toxins of certain animal parasites. Lymphocytes arrive during active re-construction, following the early mobilization of the histiocytes. Vital cultures of tonsil tissue by Kélémen-Rejto demonstrated that connective-tissue elements are found only in the capsule and trabeculæ of lymphoid structures. After irradiation, the peripheral histiocytes are phagocytic for the degenerated lymphocytes.

We have, then, as active factors of mucosal immunity, first, the constantly moving film of mucus, secondly, the ciliated epithelium, thirdly, the connective-tissue layer with its capillaries. The first two are modified by the unfavourable influence of cold, trauma, and dilution of the mucous secretions. The one constant, ever-present, defensive force, as Kahn says, ten times stronger in the skin than in the plasma, is the specific resistance of connective tissue.

Thirty years ago Metchnikoff recognized a group of phagocytic cells scattered throughout the body, which he called the macrophage system. These he identified by their phagocytic power, since staining during life by acid dyes, india ink, silver and iron salts was not made available until the work of Ribbert in 1904. Found in the spleen and liver, omentum, neuroglia and nerve sheaths, the bone marrow and circulating blood, these cells were systematically studied in 1914 by Kiyono, and a huge literature has grown up concerning their nature and functions. The early term "reticulo-endothelial" cell has been largely abandoned, since these cells are neither endothelial nor reticular. In Canada dramatic visualization of the spleen and liver by thorium compounds has been the basis for much recent experimental study.[15] Theoretical explanation of the method of "blocking" the vacuoles in the cytoplasm of these cells, as a means of demonstrating their presence in tissue or in order to facilitate experimental pathological studies, will therefore be omitted.

In an effort to account for certain discrepancies in the behaviour of individuals subjected to autogenous vaccines, I was led in 1929 and 1930 to consult with Professor Larsell, the distinguished microanatomist, trying to discover whether any study of the histiocyte system in the nose and ear had ever been made. We found that D'Antona (1930) had used trypan blue solution dropped into the nostrils, while Jannuzzi (1929) sprayed it into the throat and trachea. Diffuse coloration of all elements resulted, with little differentiation of the histiocytes; and no work on the sinus membranes had ever been done by vital staining. We therefore set to work, choosing the readily accessible frontal sinus membrane of the cat, which closely resembles that of the human being. Without the accurate and painstaking microscopic study by Dr. Larsell of many hundreds of slides from these tissues our research upon these membranes would have been impossible. Hæmatologists and pathologists could cast no light on this region for us; it was necessary to work out the normal findings by vital staining, then to resort to experiment, and this we have done for five years past.

Credit belongs to Wittmaack[16] for his truly enormous histological labours in establishing the influence of the tympanic and mastoid epithelium toward normal pneumatization of the temporal bone. His views respecting the effects of infantile otitis upon the arrest of pneumatization were disseminated in America by Pierce,[17] who remarked also upon the extraordinary variations in the thickness of the maxillary mucosa recovered on post-mortem examination from cases not showing signs of sinusitis. Neither of these observers, however, paid any attention to the histiocyte system, and they did no vital staining of these membranes. It remained for Russi, in Italy,[18] and Meyer and Schwarz, in Germany, to study the effects of phagocytosis by connective-tissue cells in the ear.

It should be recalled that the submucous connective tissue in the infant's ear is thick and soft, swelling readily when exposed to toxins or irritating foreign substances into masses of inflammatory granulations. Beneath such masses the subepithelial connective-tissue layer becomes very thick and vascular, even developing mucous glands. Wittmaack states that a layer of ciliated epithelium may develop distant from the tube, even in the antrum or mastoid cells. In the adult the connective-tissue stroma is normally very thin, with fibrous changes following the inflammations of childhood. The Eustachian tube, normally ciliated throughout, is enveloped by a layer of loose connective tissue containing the peritubal lymph follicles, or "tubal tonsil", near its pharyngeal entrance.

Russi found in 1930, using 1 per cent trypan blue on guinea pigs, that histiocytes are sparsely scattered subepithelially in the tympanum, generally perivascular, in the fibrillæ and about the fenestra. Few histiocytes were noted about the tube, but they increased in numbers nearing its tympanic orifice. During 1931, in the course of our early work on sinus membranes, we repeated and confirmed Russi's work, using cats.[19] We then studied the tubal and tympanic mucosa of a man of 30, using Maximow's eosin-azur stain. Histiocytes were scattered along the Eustachian tube, absent in the lymphatic nodules, more frequent toward the tympanic end; they are always present in the thin lining of the drum cavity. In the vascular polyps of chronic suppurative otitis media we found the usual foreign-body giant cells, plasma cells, and great numbers of histiocytes, especially about the vessels. Near cholesteatomatous areas fibrocytes were more frequent, perhaps after metamorphosis from their earlier

histiocytic and phagocytic function. Our report to the American Otological Society in 1932 was in agreement with Schwarz as to the signal importance of the connective-tissue stroma in the defensive reactions of the middle ear.

Through a small trephine opening, or by the insertion of a large antrum needle, we have succeeded in producing local trauma of various sorts, and by injecting weak gelatin cultures of potent streptococci we have been able to cause acute or chronic inflammation of the cat's frontal sinus membrane, almost exactly resembling that of human tissues. In fact, this same technique, with the addition of complete sealing of the wound of entrance, has recently been utilized by Yamamoto to produce the first experimental cases of rhinogenic meningitis.[20]

Histiocytes are numerous in vascular areas of the body, about equal in number to the fibroblasts, into which they metamorphose after their phagocytic task is complete. They are found in the body tissues before the arrival of polymorphonuclears and lymphocytes, resting, quiescent, awaiting some irritant stimulus to mobilize, become rounded, amœboid, elbowing their way through intercellular spaces to ingest foreign particles into the vacuoles of their cytoplasm.[21] McMahon's recent study of ionization of the sinus membranes demonstrates an increase of local leukocytosis and phagocytosis with some hyperæmia; but he points out that similar changes would occur from solutions of the electrolytes used without any current, and that some epithelial destruction and hæmorrhage takes place. He does not mention any increase of histiocytes as a result of ionization.[22]

Readily demonstrable by dyes and india ink in animals, histiocytes must be brought out in human tissues by the eosin-azur stain of Maximow. Vital staining of human tissues, of which conjunctival argyrosis is an example, would of course be impossible on account of the blue or gray colouring of all exposed mesenchymal structures.

We reported at the American Academy meeting in 1931 upon cat frontal sinuses secured and vitally stained 48 to 72 hours after various sorts of trauma.[23] Dull curettage made the normally paper-thin membrane distinctly bluish, much thickened, with marked histiocyte accumulation. Injection of warm paraffin caused much epithelial damage, and brought in numerous histiocytes and many polymorphonuclears. Inoculation with a human streptococcus culture brought many histiocytes and numerous lymphocytes in a thick congested membrane; if kept alive to the subacute stage, polyblasts and fibroblasts were found, indicating repair processes at work. Simultaneous curettage and streptococcus inoculation intensified the histiocyte response. Twenty per cent gum acacia stuck down the cilia, and produced much œdema and congestion, but no increase of histiocytes. This work was continued during 1931-32 and since by a succession of generous grants by the American Academy of Ophthalmology and Otolaryngology. In Montreal, two years ago, we reported on a series of agents stopping ciliary action—soap jelly, thick and thin glucose, cocoanut oil with agar, chondrus jelly, mucilage of tragacanth, and scarlet red-oxyquinoline sulphate in oily suspension. These all produced destructive changes in the mucosa without increase of histiocytes. Ionization similarly destroys ciliated epithelium, no matter whether silver salts, india ink, or zinc sulphate solutions are used, according to McMahon.

Based on theoretical considerations drawn from cytological research, a series of experiments was made with the alkaline earths. There was a notable increase of histiocytes in spite of the loss of cilia and some epithelial damage, using calcium hydroxide 5 per cent in 0.5 per cent agar. Calcium lactate 1 per cent in 1 per cent gelatin, showed protective layers of histiocytes under areas of epithelial loss; similar but less marked changes came with sodium phosphate, 1 per cent in 2 per cent gelatin.

Human material was secured from patients with clinically and radiographically equal double maxillary sinusitis by the Caldwell-Luc operation under local anæsthesia. Tissues were fixed in Zenker's fluid and stained with eosin-azur. In general these tissues fell into three classes: (1) fibrous repair showing many plasma cells; (2) an apparently allergic type—much œdema, many eosinophils, a few more histiocytes than normal; and (3) types showing different conditions in various parts of the same sinus. In one human case, one antrum was washed twice a week for two months with milk of magnesia. This caused marked œdema, fairly numerous histiocytes, some fibroblasts, and very numerous eosinophils. The other side, washed with normal saline solution, showed marked

œdema, loss of cilia, and round-cell infiltration.

Corbus made use of intradermal vaccination against inaccessible neisserian complications, hoping to activate histiocytic defense at points of inflammation through the sympathetic nervous system. Attempting this on a cat acutely infected with a virulent streptococcus sinusitis, with intradermal inoculation of the same inactivated streptococcus in vaccine form, we found many more histiocytes than would normally appear in such an acute sinusitis. This was the first time that we had secured histological evidence of the effects of a vaccine upon inflamed tissues in the sinuses.

Diets for upper respiratory disease, especially those with added vitamin content, have long engaged the attention of pædiatricians, internists, and oto-laryngologists. Dean, Stucky, Shurly, and many others have demonstrated conclusively the great value of increased and accurately planned diets in those suffering from any deficiency that has lasted long. But Dean long ago pointed out, and has recently reiterated, that diet alone will not cure sinus disease. Jarvis, following clinical observation of pale and reddened septal mucosæ, was led to counsel marked increase in acid and alkaline components of the diet to remedy the underlying biological imbalance which he suspected. While they are continuing the biochemical approach to the sinus problem, the "colour index" has been disproved by other workers, and attempts to improve thyroid function and other endocrine and metabolic factors have engaged the attention of Jarvis and his collaborators. Salt-free diet, helpful for the reduction of œdema in certain renal insufficiencies, has been recommended by health-columnists and other writers on medical topics for the laity.

Because of the general interest in the subject of diet in sinusitis, and the lack of actual histological evidence of what happened when certain diets were used, part of our research for the Academy during 1932-33 was directed toward this problem, and was reported last September in Boston. We caused a series of cats to be inoculated in one frontal sinus, so as to bring about chronic changes in the membranes. Immediately after this inoculation, each cat was separately caged to avoid cross infection, and was maintained for two months on one of the following diets, planned by the Department of Physiology :(1) rich in vitamin A; (2) excess acid; (3) excess base; (4) high sodium (omitting chloride); (5) high potassium. All the diets were purposely salt-free; the animals were all well nourished, and suffered from no previous dietary deficiencies. At the end of two months both the infected and non-infected frontal sinus membranes were examined. Little or no change in the general physical condition of the animals had taken place, and microscopic study disclosed that not one of the diets had in any way arrested the usual progress of these infected membranes into a chronic stage of inflammation with accumulation of many plasma cells. The severest changes were found after the much lauded basic diet; less and less disturbance was noted, respectively, with the acid, the sodium and the potassium diets. Excess vitamin content failed to inhibit chronic inflammatory changes. Several cats had, for a time, crossed involvement, with sniffles and lacrimation, to the uninfected side. It seems clear that special diets do not arrest acute sinusitis or prevent its development into chronic sinusitis in the well-nourished cat.

Tissues were studied from a case of bacterial allergy in which a rigid salt-free diet had been followed for two months, but on operation much œdema, with purulent cysts and plasma cell and eosinophile infiltration, was discovered on both sides.

Butler and Woolley, using our technique, have just reported to the Section on Radiology of the American Medical Association their results on a series of infected cat frontal sinuses irradiated with approximately the human dosage, from which the tissues were recovered at intervals from one day to sixty days following irradiation.[24] We suggested this histological check on their results in human beings, and Professor Larsell examined all their slides. As in the tonsil, marked destruction of lymphocytes occurs after irradiation, and within three or four days these membranes show a great influx of histiocytes and large polyblasts, apparently mobilized to carry off by phagocytosis the destroyed lymphocytes. Later, fibrocytes and fibroblasts replace or develop from these histiocytes; the membrane becomes thinner and more fibrous. The epithelium, at first damaged by inflammation, rapidly reforms and shows normal ciliated cells.

We have, however, investigated several human irradiated chronic antrum cases, in which tissues were secured by radical operation; two, operated on one month after unilateral irradiation, and another, six months after bilateral irradiation. The first two presented well marked fibrosis with basophils and many plasma cells; few histiocytes and no lymphocytes were found on the treated sides, a good many of each on the untreated sides. The six months' case showed the usual plasma-cell infiltration of chronic infection, with masses of polymorphonuclears, focal abscesses, and lymphocytes, in spite of fibrotic changes. Apparently fibrosis furnishes no guarantee against reinfection; the x-ray possesses no bactericidal powers.

Several cases of bilateral chronic maxillary sinusitis received calcium lactate, gr. x, t.i.d., for a month; others 10 c.c. of 1 per cent calcium gluconate, intravenously, twice a week for a month. All these improved as to discharge and odour, one refusing operation because of improvement. Tissues recovered showed less than the usual œdema, much fibrosis, few polymorphonuclears, few lymphocytes, plasmoid red-staining Russell bodies and numerous brick-dust granulocytes, and many plasma cells; the epithelium was much broken down, however. Irrigation with Locke's solution twice weekly for a month demonstrated tissues with layers of plasma cells, marked fibrosis, cells with red granules, but bad epithelium. In collaboration with Dr. Lester Jones of my department it was found that injection of heavy irradiated hydrocarbon oil twice weekly for a month did not improve the membrane of chronic antra, but, owing to ciliary damage and impaired drainage, led to epithelial destruction and marked polymorphonuclear infiltration. Making use of the Corbus intradermal vaccination on cats whose sinusitis had remained chronic one month, these membranes, ordinarily full of plasma cells and with almost no histiocytes, showed a slight influx of histiocytes, apparently into regions of perivascular round-cell infiltration. Apparently these areas, resembling an acute exacerbation grafted upon the chronic process, represent microscopically what such a vaccine brings about in these chronic membranes. We feel that it is now established that the histiocyte system takes up early defensive measures in the sinus and ear membranes during acute invasion or acute exacerbations of chronic processes. Plasma cells are found, to the exclusion of histiocytes, in all late and chronic stages of inflammation and repair.

Research for 1933-34, which the American Academy again requested us to carry on at the University of Oregon Medical School with its generous grant of funds, will be reported this fall in Chicago, and thus far includes an investigation of the lymphatic channels from the sinuses by vital staining of histiocytes within such channels, after methods suggested by Wojatschek's work on the turbinates, and Pfahler and Le Mèe's observations on lipiodol in the lymphatics; investigation of the blockade of the sinus ostium by œdema, whether this be due to interference with lymphatic drainage or not; investigation of a further series of irradiated human antra, of others treated by diathermy; study of the incidence of low basal metabolic rates in chronic sinusitis; investigation of animal membranes following foreign protein injections; of others subjected to various local antiseptic solutions; and finally, of the local effects on sinus membranes of cervical sympathectomy.

We have been traversing uncharted seas, and our findings have been full of surprises; it has been necessary to figure out methods as we have gone along. Professor Larsell's high scholarship and inspiring collaboration have made our work possible so far.

May I say that none of our conclusions will seem unusual or startling, however laborious, if one considers them as developments of the conceptions of Claude Bernard, seventy years ago, and of Metchnikoff, fifty years ago. Natural immunity of tissues in this field was discussed by Henry Wagner, of San Francisco, before the American Laryngological Association in 1898.[25] Also, I am privileged to quote a letter from that Nestor of British otolaryngology, Mr. Herbert Tilley:[26] "I described before the Odontological Society of Great Britain in 1892 how an operated-on antrum became recovered by epithelium spreading in from the naso-antral opening, joining with islets of epithelium on the inner surface of the curetted antrum". "Nothing is new," he says, "and possibly my observation could be antedated by the surgeons and physicians of Tutankhamen's time". In this connection it may be suggested

that the Edwin Smith papyrus of the seventeenth century B.C., copying an ancient book of perhaps 3000 B.C., recommends the application of fresh meat to injuries of the maxilla, as well as to other wounds—quite the earliest recorded instance of therapeutics by tissue juices and cellular extractives in this region.[27] One cannot, however, refrain from meditation upon the possibilities of the mastery of mucosal pathology which may follow methods, as yet unguessed, of influencing the sympathetic and the endocrine mechanisms.

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Those specially interested can obtain a fuller bibliography on application to the author.

COMPLICATIONS AND DISAPPOINTMENTS IN RADIUM THERAPY FOR CANCER OF THE UTERUS*

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EXPERTS in the field of radiology need not be reminded of the manifold dangers and disappointments in the application of radium. They know full well that an agent so marvelously effective is capable of much harm, and are conscious of their limitations in their endeavour to eradicate the disease without doing violence to normal structures. But what of the untrained and the inexperienced in whose hands is placed this two-edged sword? George Gray Ward writes: "If radium is used, experience and a thorough understanding of the action of this powerful agent and a full appreciation of the complexities of its safe and efficient application is essential, otherwise we assume a grave responsibility in not giving these patients a chance for their lives". If the utmost good is to be accomplished there must be available the combined efforts of the clinician, the pathologist, the physicist, the radiologist; which is quite another thing from assuming the entire responsibility single-handed. An ample supply of radium and a patient are not enough. I take it to be the duty of experienced radiologists to apprise the beginners in radium therapy of the many pitfalls in the application of radium, lest they go head-on into them, and this I infer is the real intent of your Committee in presenting for discussion the subject of complications and disappointments in pelvic radium therapy.

Doctors who have never employed radium are being solicited by commercial organizations. I quote from a pamphlet from one such: "Think of the advantage you would enjoy by having the counsel and cooperation of a group of radium therapists when you have occasion to consider

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treatment for a malignant case—the value of having radium emanation specially prepared for each case, so that its application could be carried out according to methods developed and sponsored by the world's ablest radium therapists—methods which you yourself can safely employ''. Could anything be more misleading and vicious in its potentialities? Such treatment by remote control is not control. The availability of radium for those who know how to use it is greatly to be desired, but for those who do not possess the requisite skill and experience it is to be deplored. I take it that this injunction applies with equal force to the hospitals which are placing radium at the disposal of all who hospitalize cases, without requiring the supervision of a trained radiologist and pathologist.

The disappointments in radium therapy are in the main two-fold. There is disappointment in the large proportion of cases that present themselves in the advanced stages of the disease, and there is disappointment in the results of under-irradiation, whereby the cancer cells become radio-resistant and the normal tissues become sensitized. Unfortunately, we possess no certain means of determining in advance of treatment the degree of tissue reaction, for, as Bowing says: ''It is clinically impossible to select patients who are decidedly sensitive in reaction from those in whom the response seems sluggish or retarded''; and Robert B. Greenough says: ''The surgeon may err in doing too much on the advanced cases and too little on the early and favourable cases''.

The ideal dosage is that which will effectively destroy all cancer cells without doing irreparable damage to normal tissues. The determination of the dosage is based upon the general condition of the patient, the type of cell, the condition of the organ affected and the neighbouring organs, and finally upon the extent of the invasion. Schmitz has attempted to standardize the dosage, and arbitrarily fixes the 100 per cent erythema dose as equivalent to 3,200 milligram hours of radium for the embryonic cell types, and for the adult squamous cell type, a 150 to 175 per cent erythema dose, or 4,800 to 5,600 milligram hours of radium. This he believes to be the limit of resistance of normal tissues.

Recurrence of the growth in and near the seat of irradiation implies failure to give sufficient irradiation in the initial treatment. In support of this contention Healy[9] found that 26.5 per cent of these recurrent lesions responded to radium treatment, and hence had not been made radio-resistant in the initial treatment. Admitting the contention that such recurrent growths are usually associated with more remote invasions, the results obtained by Ward,[20, 21] Taussig, and others fully justify the cautious and timely application of radium to these recurring growths. Herein is the great value of the follow-up system. Ward[21] reports nearly 50 per cent of re-irradiations in the New York Woman's Hospital, with a cure-rate of 26.5 per cent in 170 re-irradiated cases in which the radium was applied to spots of persistent and recurrent carcinoma. He would limit his dosage in these recurrent cases to 300 to 1,200 milligram hours, with adequate screening, avoiding prolonged and massive doses. This is in line with the procedures of the Radium-hemmet in Stockholm, the Munich clinic, and the Marie Curie Hospital in London. When the recurrent growths are found to be radio-resistant surgery should be invoked where possible. I have consistently pursued this practice and with results that are most gratifying.

If the disappointments in radium therapy are largely the result of under-irradiation, by the same token the dangers of radium therapy are due in large part to over-irradiation. Factors other than the amount of radium and the hours of its exposure enter into the picture of over-irradiation. Of perhaps equal, if not greater, import, is the matter of distance and of screening, and it is here that the experienced operator is able to forestall many a mishap that would befall the inexperienced.

I am persuaded that the general condition of the individual is a most important consideration and one that is too often disregarded. The better the health of the individual, the better the reaction to treatment. Poorly-nourished, anæmic, and cachectic patients as a rule suffer more from distressing initial symptoms, such as nausea, vomiting, headache and vertigo, and the normal tissues are more disposed to break down under the influence of the rays. Further, the primary mortality is increased through toxic and septic absorption. A primary mortality above 2 per cent (as high as 8 per cent has been reported) is accounted for by two factors, both largely preventable, *i.e.*, general low body resistance and infection. It follows that a preparatory process of building up the resistance of the

individual is of the utmost importance. Time will be well spent in enjoining rest, in directing the diet, and, if need be, in correcting extreme anæmias by blood transfusion.

There are those who hold that all cases, however advanced, should be irradiated, and justify their position by citing most unpromising cases that have responded to irradiation in an unexpected manner. As in surgery, so with radium therapy, though to a lesser degree, there are definite limitations beyond which we cannot go with safety. Professor Regaud[17] would have us weigh the chances between possible improvement and aggravation of the existing condition, taking into the reckoning the general condition of the patient and the means at our command. Assuredly massive doses are to be avoided in the presence of cachexia and emaciation.

Irradiation of an infected area is a positive danger, and every means should be employed to rid the tissues of infection before applying radium. As a gynæcologist I confess that I am unable to share in the "jittery" feelings of many radiologists who are so fearful of the spread of infection by even the most ordinary manipulations of the cancerous cervix. There are those who profess to see danger in digital examinations, in dilating the cervix, in biopsy, and in the application of the cautery. They prescribe vaginal douches, which is all very well for purposes of ordinary cleanliness, but cannot possibly rid the cancerous mass of the infecting organisms. The high voltage pelvic roentgen-ray cycle best prepares the cervix for subsequent radium applications; with its judicious application the cancerous area becomes more circumscribed and the virulence of the infection is diminished. Unfortunately, it is not always possible to detect latent pelvic infections, yet it is of the utmost importance to exclude the presence of pyometra, pelvic cellulitis and salpingitis before applying radium. Infected appendages should first be removed, the pent-up secretions of a pyometra must be released, and a pelvic cellulitis calls for a preliminary rest period.

In reviewing the literature of the past five years, I find that the mortality of radium therapy is directly chargeable to infection more than to all other factors combined. The mortality from sepsis (septicæmia, peritonitis, septic pneumonia) varies from 0.5 to 2 per cent in the hands of experienced radiologists. Ward gives a mortality rate of 1.1 per cent in advanced cancer of the cervix in 558 cases. J. Ducuing had 1 per cent of general peritonitis, pyometra, and fatal sepsis in 240 private cases of cancer of the cervix, while in 60 per cent there was some fever following irradiation. Five of the 13 deaths in 427 cases of cancer of the cervix reported by Nègre and Guilhem[15] were due to sepsis; Petit-Dutaillis had a primary mortality of 7 per cent from sepsis in advanced cases where the cervix had not been amputated by electro-coagulation, whereas there were no deaths in the group in which the cervix had been previously removed. Bowing emphasizes the advantage of having the patient in the knee-chest position under direct light. In this position the field of operation is cleansed and the radium applied with accuracy and with the minimum of manipulation. "The rule is," says Bowing, "that the necrosis subsides and the chance of hæmorrhage passes away and the dangers associated with the infection are reduced."

Dr. Leda Stacy,[19] of the Rochester Clinic, warns against pursuing the radium treatment when septic symptoms arise in the course of treatment. "In this event the radium treatments are discontinued until the temperature has remained normal for several days and until all local evidence of reaction has subsided. If there is definite evidence of peritonitis, all food is withdrawn and the patient is given a normal salt and glucose solution by bowel, and ice bags are applied to the abdomen. If the symptoms are less severe and there is apparently only a slight local reaction, forced fluids by mouth, basic diet, and absolute rest in bed, with ice to the abdomen, usually clear up the symptoms. Preliminary treatment to clear up the infection in the cervix before inserting radium into the uterus usually prevents the occurrence of infection during the radium treatments." It is apparent that if we could do away with the incidence of infection the mortality from radium therapy would be almost negligible. That the incidence of infection is not always the result of trauma together with contamination from inadequate asepsis is evidenced by the occasional occurrence of spreading infection following external roentgen irradiation, the contributing factor being the lowering of the

tissue resistance in the presence of a latent localized infection.

"Many patients," says H. H. Bowing in a personal communication, "are seen very late in the disease, when complications of various types are impending, such as fistulæ, pelvic cellulitis, hæmorrhage . . . On careful analysis of these cases it is usually found that these complications were present and that the treatment had very little, if any, part in their precipitation . . . About 150 cases of cancer of the cervix a year are irradiated in the Mayo Clinic, and of this number about 1 to 2 per cent succumb, and as a rule the patients that succumb are in the advanced phase of the disease. And, further, they are usually the ones who have received benefit from the initial treatment, but the local recurrence is now responsible for their steady downward course, and we have learned not to treat these recurring cases intensively."

The primary mortality in radium treatment of cancer of the cervix may be visualized in the following Table.

Kessler-Schmidt.—256 cases with 17 deaths (6.6 per cent).
Bowing.—178 cases with 1.51 per cent mortality.
Ward, W. W.—558 cases with 1.1 per cent mortality in all classes, and 1.37 per cent in classes III and IV (436 cases).
Heyman.—1.59 per cent mortality.
Keene, Floyd.—1.17 per cent mortality.
Schroeder, R.—256 cases with 14 deaths (5.5 per cent).
Healy, W.P.—approximately 1 per cent,
Ducuing, J.—240 cases with 3 per cent of deaths.
Negre and Guilhem.—427 cases with 13 deaths (3.04 per cent).

Karl H. Martzloff says: "There are numerous pitfalls for the experienced as well as the inexperienced in the use of radium. They apply whether radium is used as a surgical adjunct or as the sole method of treatment. We may only emphasize here a few of the important considerations that confront the individual who employs both surgical and radiological methods, and is, therefore, probably not so well versed in the use of radium. Radium treatment of advanced, markedly infected, cervical cancer is complicated by an appreciable morbidity and a mortality considerably higher than one would infer from the mortality statistics for radiation therapy. Therefore, the generally accepted mortality rate of 2 to 3 per cent for patients treated by radium only reflects the lethal rate for a whole group of operable, borderline, and inoperable patients. It does not indicate that the mortality from radiation of operable and borderline cases is slight, while the advanced inoperable cases may yield a primary death rate of 6 per cent or better, as reported by Clauberg and others."

While necrosis is usually the result of over-irradiation we have not reached that degree of perfection in technique that will wholly eliminate its occurrence. Re-irradiation is responsible for perhaps the major proportion of instances, and massive doses more than smaller, divided doses. In cancer of the cervix I think it only fair to hold radium responsible for vaginal fistulæ occurring within three or four months of its application. All fistulæ arising at a later date may be assumed to be due to malignant invasion and disintegration. Dr. F. R. Smith, of the New York Memorial Hospital, concludes that the type of therapy is the determining factor, and bases his belief on a review of 2,852 cases of cancer of the cervix. He finds vaginal fistulæ more frequent following interstitial irradiation, where massive doses are given, where the tissues are infected, and after supravaginal or total hysterectomy. In his series recto-vaginal fistulæ occurred once in 75 cases, vesico-vaginal fistula once in 92 cases, and combined fistulæ once in 129 cases. Smith is of the opinion that a preliminary high voltage x-ray cycle will diminish the size of the growth, eliminate infection, and thereby decrease the incidence of fistulæ. Important as these considerations are, we shall fall short of obtaining the maximum of security if we fail in the selection of proper containers for the filtering of rays, if we do not judge wisely the amount of radium element and the time of exposure. Effective packing of the vagina and a retention catheter in the bladder will go far to safeguard the bladder and rectum from injury. Bowing says: "It is possible to treat cancer of the cervix so as to cause a complete but sufficiently slow disintegration of the malignant process that the normal tissues are filled in and thus prevent potential rectovaginal fistulæ as well as vesico-vaginal fistulæ." In a personal communication, Dr. H. S. Crossen reports 118 radium-treated cancers of the cervix, with 1 vesico-vaginal

fistulæ and 3 rectovaginal fistulæ, one of which developed late and was due to malignant invasion. In this series intensive irradiation was applied. Crossen accounts for this excellent showing by the care exercised in the study of conditions within the pelvis and the adaptation of the radium implantation so as to give the maximum dosage within the margin of safety. In all fairness to radium therapy, we find more vaginal fistulæ in untreated cases. Taussig finds five times as many recto-vaginal and vesico-vaginal fistulæ in untreated cases as in the irradiated group.

The problem that is yet unsolved is to apply a lethal dose without injury to normal structures, and its solution now seems to rest in more extensive employment of external irradiation. This Professor Regaud has definitely demonstrated in his incomparable results in the irradiation of cancer of the cervix. "We are not content", says Healy, "with 55 to 60 per cent of results in early cancer of the cervix—the difficulty is in applying lethal doses to the lymph nodes and parametrium without damaging the intervening normal structures." To avoid destruction of normal tissues, where the growth fails to respond to irradiation, Healy would perform hysterectomy when conditions permit. By so doing extensive necrosis will be avoided, hæmorrhages and disagreeable discharges will be checked.

I have found it extremely difficult to determine the incidence of vaginal fistulæ as reported by various authorities in the literature. Without knowing the extent of the invasion, and the time of occurrence of the fistula in respect to the application of the radium it is not possible to separate those fistulæ due to radium and those due to extension of the growth. For example, Gilbert Strachan reports 22 fistulæ in 254 cases, or 8.7 per cent, as compared with 6 fistulæ in 449 cases, or 1.83 per cent, reported by C. Schroeder. The discrepancy in the results of these two authorities is very great, but without knowledge of all details of technique employed, without segregating them in various groups, and without knowing the time of appearance of the fistulæ in respect to the application of the radium no conclusions can be drawn.

I am indebted to Dr. Frank Lynch, of the University of California, for the following records from his cancer clinic.

Total number of cases..... 424
Known number of fistulæ..... 56
Suspected from correspondence..... 5

Of the 61 known and suspected fistulæ:

10 were present before treated
29 were known to be due to extension of the disease
5 were suspected to be due to the extension of the disease
17 were due to the radium.

Of the 17 cases chargeable to radium:

1 was undoubtedly due to radium
14 were most probably due to radium
2 were probably due to radium
1 was in Group II (Schmidt)
5 were in Group III (Schmidt)
1 was in Group IV (Schmidt)
7 were in Group V (Schmidt)
6 were recurrences following panhysterectomy
1 was a recurrence following amputation of cervix

All 17 cases would probably have developed fistulæ without radium.

In 289 irradiated cancers of the cervix I have had two vesico-vaginal and one recto-vaginal fistulæ directly chargeable to radium. All three were in Group III (Schmidt). One vesico-vaginal fistula healed spontaneously. I have had no fistulæ in the past four years due, I think, to more careful screening. Dr. Floyd Keene writes that in the University of Pennsylvania clinic, out of 684 cases, they have had 44 vaginal fistulæ; 19 of this number were chargeable to radium. Only 4 fistulæ developed in the past five years, due unquestionably to modifications in technique in this period.

So far we have considered complications which follow closely upon the application of radium but there are remote consequences which are no less serious. It requires a nicety of technique to regulate the dosage and the screening to obtain the required destructive effect upon the cancer cells without doing violence to normal tissues. Not only would we avoid extensive sloughing, septic absorption, and hæmorrhage, but the building up of an excessive amount of connective tissue which leads to all manner of disturbances following prolonged and repeated exposure to the rays. These "late reactions" are not experienced for several months and even later, and may be misinterpreted. The pain, the ulcerations, and the discharges are often thought to be due to a recurrence of the malignancy.

H. Eymer calls attention to an infiltration of the parametrium following closely upon intensive irradiation that may obstruct the ureter, but the obstruction is usually temporary and does not call for ureteral catheterization. This

zone of infiltration in the parametrium may persist and be mistaken for cancerous infiltration. Where a similar process extends to the bladder and rectum we have what is clinically designated as acute cystitis and proctitis. Experience has shown that interstitial irradiation brings about these changes more often and to a greater degree than does surface irradiation. We are all familiar with the early bladder and rectal disturbances which last from a day to two weeks, but it is the appearance of late lesions in the bladder and rectum that often leads to confusion. Too often these late reactions are interpreted as malignant invasions which call for further irradiation. No such conclusion should be reached without a biopsy. Resort to irradiation would only serve to aggravate the condition, and lead to the deepening of ulcers, to possible hæmorrhages, and subsequent cicatrization.

In late reactions in the rectum and sigmoid one sees œdema and congestion of the mucosa together with a fibrino-plastic exudate, with possible multiple ulcers. These ulcers may lead to profound anæmia from continued leakage of blood. Ultimately there may be constriction of the lumen of the gut, even to complete obliteration. All this is most distressing, and we are not to add insult to injury by hastily concluding that the rectal disturbances are due to malignant invasion and on this hypothesis proceed to further irradiation. Here, as in the bladder, a biopsy should be made before deciding upon any therapeutic program other than palliative measures.

In cancer of the cervix following upon supravaginal hysterectomy, and in all cervical cancers associated with pelvic adhesions, there is the possible danger of doing violence to an adhered loop of bowel. This calls for guarded dosage.

Cancer of the cervix, untreated, leads almost invariably to definite lesions of the urinary tract. These lesions are the results of ascending infection, of compression of the ureters by connective-tissue formation in the parametrium, the encroachment of the malignant mass upon the ureters, and finally the direct invasion of the bladder and ureters by the cancer. The introduction of radium therapy has added measureably to these urinary lesions, due to the spread of infection and to the late formation of connective tissue in the parametrium, causing constriction and even complete obstruction of the ureters.

A. L. Reed estimates the frequency of bladder lesions to be about 2 per cent in all irradiated cases. This does not include the commonly observed irradiation erythema arising within 48 hours of irradiation, in which there is temporary œdema and vascularization of the base of the bladder. This is a transitory and self-limiting condition that rarely persists beyond two weeks and yields readily to palliative treatment. The symptoms of painful and frequent urination, sometimes bleeding, are greatly augmented where there has been a pre-existing cystitis. A history of bladder disturbance should always call for a cystoscopic examination before proceeding with irradiation, and in event of the finding of a cystitis steps should be taken to relieve the bladder irritability before applying radium. Where there is suspicion of cancer a biopsy should be made, and if cancer of the bladder is present radium should be withheld, and in its stead the high voltage x-ray pelvic cycle should be used. To proceed with radium would be to invite aggravation of bladder symptoms and possible fistula formation. Henry Schmitz forcibly calls to our attention the late reactions within the bladder wall to radium irradiation. Fibrosis and endarteritis obliterans lead to ulcer formation which develops insidiously and is most distressing. The bladder mucosa is white and glistening, the base of the bladder loses its elasticity and becomes fixed, small indolent ulcers covered with urinary salts appear, which slowly widen and deepen and may terminate in vesico-vaginal fistulæ. Too often these lesions are assumed to be malignant, and resort is had to re-irradiation, which only serves to aggravate the condition.

Partial and complete obstruction of the ureter often escapes recognition, as do the resulting lesions — hydro-ureter, hydronephrosis, pyelitis and pyonephrosis. Martin and Robers call attention to the dangers of inserting needles in close proximity to the ureters because of the resulting fibrosis, which, in turn, may constrict the ureter.

To reduce the incidence of urinary complications there must be preliminary treatment of pre-existing urinary infections. A cystoscopic examination should precede the application of radium where there is a suspicion of infection,

and the insertion of a retention catheter, together with firm packing of the vagina, will do much to protect the bladder from the radium rays.

Pyometra, once considered a rare lesion, is now placed among the major end-results of radium therapy. In 1852 irradiated cancers of the cervix collected from the literature (Ducuing, Begouin, Guilhem and Gouzy,[8] Norris) pyometra occurred in approximately 1 per cent of all irradiated cases. The high percentages, (8 to 10 per cent, reported by some authorities) are probably accounted for by the inclusion of cases associated with foul discharges and classified as incomplete pyometra, in contra-distinction to the complete type which has no accompanying vaginal discharge. With the destruction of the gland structures of the cervix, leaving the endometrial glands intact, we can readily understand how the subsequent contraction of the cervix, incident to post-irradiation fibrosis, may obstruct the outflow of the secretions from the body of the uterus. Brooke Bland[3] has observed a case in which the pent-up secretions distended the uterus to the size of a five-months' pregnancy. In these secretions we find the colon bacilli, staphylococci, streptococci and anaerobic organisms. As a rule the streptococci are seldom hæmolytic, and are rarely of a virulent type. More often pyometra develops in recurrent malignancy.

It is unlikely that the uterus could distend without pre-existing myometrial degeneration. With the loss of contractibility of the uterine musculature the secretions are not forced through the contracted cervix, and so accumulate within the cavity of the uterus. It is seldom that pyometra develops short of several months following irradiation. Re-irradiation of the cervix in the presence of pyometra is dangerous. The consequences may be the development of phlebitis, pelvic cellulitis, peritonitis, pyosalpinx, septicæmia, septico-pyæmia and death.

There would seem little excuse for failing to recognize pyometra. The simple procedure of dilatation of the cervix will suffice to disclose the condition and to interdict the application of radium. Pyometra is not always preventable, but certain precautionary measures are recommended. The disinfection of the cervix before inserting the radium and the periodic passage of a sound in the months following irradiation are worth-while precautions. Where the cervix is completely obstructed and cannot be opened a hysterectomy should be considered, but because of associated inflammatory lesions the operation may be fraught with grave danger.

All will agree that cancer of the body of the uterus is a surgical lesion. Graves[7] warned of the false sense of security in the effects of irradiation in this class of cases, due to the temporary arrest of the hæmorrhages and the general improvement while the disease continues to progress. These cases are usually of the adeno-carcinomatous type, which are radio-resistant to a high degree. Graves would hysterectomize these cases, even at great risk. On the other hand, Healy, in reporting 134 cancers of the body of the uterus, has had no primary mortality in the irradiated inoperable cases; this in contrast to a 3 per cent primary mortality in Döderlein's group. Heyman reported 45.7 per cent of five year cures in all cases and 60 per cent in the operable group. Voltz reports 60 per cent of five year cures and Pfahler believes that 62 per cent of all cancers of the body of the uterus can be cured by skilful irradiation, and adds that "when and where expert radiological service is available, in which both radium and high voltage x-rays are used, a higher percentage of cures can be obtained by irradiation, and with less risk than if treated by surgery".

All complications common to cancer of the cervix are less frequently encountered in radium-treated cancers of the body of the uterus except pyometra. It is noteworthy that Heyman reports 60 per cent of five year cures from radium in cancer of the body occurring in several clinics, a record comparable to surgical therapy. May it not be anticipated that with improved technique and a more judicious selection of cases cancer of the body of the uterus, as with cancer of the cervix, will be more and more subjected to irradiation rather than to surgery?

CONCLUSIONS

1. The availability of radium for those who know how to use it is to be desired, but for those who do not possess the requisite skill it is to be deplored.

2. The disappointments in radium therapy are in the main two-fold—the large proportion of

cases presenting themselves in the advanced stages of the disease, and the failures due to under-irradiation.

3. "The surgeon may err in doing too much on the advanced cases and too little on the early and favourable cases."

4. Recurrence of the growth in and near the seat of irradiation implies failure to give sufficient irradiation in the initial treatment. A careful, persistent follow-up system, with re-irradiation of recurrent growths that show response to the rays, will greatly enhance the chances of cure.

5. The dangers of radium therapy are largely the result of over-irradiation. Proper regard for distance and screening will forestall many a mishap.

6. Too little attention is paid to the general condition of the patient. Emaciation, cachexia and anæmia tend to multiply and aggravate complications.

7. The mortality of irradiation therapy is largely chargeable to infection, either introduced at the time of irradiation, or, as is more often the case, to the awakening and spread of a pre-existing pelvic infection.

8. Necrosis of normal structures is not always avoidable, but has been greatly lessened by the giving of less massive doses, more careful screening, and the preliminary use of the high voltage x-ray pelvic cycle.

9. The problem that remains to be solved is to apply a lethal dose without injury to normal structures, and the solution of this problem now seems to rest in more extensive employment of external irradiation.

10. Prolonged and repeated exposure to the radium rays tends to build connective tissue, and give rise to distressing complications that are too often interpreted as a recurrence of the malignancy. These "late reactions" are found notably in the parametrium, bladder, ureter, and rectum.

11. Cancer of the body of the uterus, long recognized as strictly a surgical lesion, is being irradiated with gratifying results.

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ERGOTAMINE TARTRATE IN MIGRAINE.—Brock, O'Sullivan, and Young have investigated the effects of hypodermic adrenaline, ephedrine, ergotamine tartrate, mecholin, insulin, amyl nitrite inhalation, histamine, follutein, amniotin, etc., on twenty-five patients with typical long-standing, severe, and intractable migraine. Vagal stimulation has been shown to produce bilateral cerebral vaso-dilatation, and cervical sympathetic stimulation to cause ipsolateral pial vaso-constriction. This research was undertaken to study the effect of sympathetic, parasympathetic, and other organic drugs in causing or relieving migraine attacks. Histamine, follutein, and amniotin were the only ones which initiated attacks in an appreciable percentage of cases. Mecholin relieved four out of eight cases, but the headache tended to return in half an hour. Ergotamine tartrate 0.5 mg. (trade name, "gynergen"), which paralyzes the sympathetic nerve endings, relieved fourteen patients in thirty-four attacks within one to three hours. It failed to relieve four patients. It was more effective subcutaneously than when given by mouth.—*Am. J. M. Sc.*, Aug., 1934, p. 253; Abs. *Brit. M. J.*

CLINICAL HYPERTHYROIDISM ASSOCIATED WITH A NORMAL BASAL METABOLIC RATE*

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Toronto

IT has long been recognized that a patient may suffer from hyperthyroidism in the absence of a continually elevated metabolic rate. This disease is characterized by remissions and exacerbations. Is it possible also that there may be a group of patients suffering from hyperthyroidism who have a consistently low or even a subnormal basal metabolic rate? Clute,[1] in an address before this Society in 1928, suggested that there were patients "with history and physical examination . . . . entirely consistent with hyperthyroidism, yet the basal rate is normal or subnormal". Troell[2] published in 1932 an analysis of 14 cases of clinical hyperthyroidism with inconstant basal metabolic rates. He concluded that the clinical syndrome of thyroid intoxication may exist in the presence of a normal metabolic rate. Plummer[3] has placed on record a case of hyperthyroidism having a basal rate of –9.

The study we wish to present is an analysis of 71 cases of clinical hyperthyroidism with normal metabolic rates. We accept as a normal basal rate readings from –10 to plus 15. Seventeen of the cases showed diffuse, and 54, nodular changes in the gland. All patients were operated upon at least one year ago, the average time since operation being 3.7 years. There was no mortality.

GROUP 1. CASES PRESENTING A DIFFUSELY INVOLVED GLAND

Sixteen of the 17 cases with diffusely involved glands occurred in females. Eleven were public ward and six were private patients. As a result of this study it has been impossible to establish a definite clinical syndrome for this group. One patient dated her illness from a tonsillectomy; 1 from the death of her mother; 2 complained of ill health following an attack of influenza. Twelve cases appeared to have no inciting factor. A fullness in the neck was noted by 5 patients and had been present for an average of eight years. Two patients stated that the fullness increased during menstruation.

Fatigue, irritability, nervousness and palpitation, excessive perspiration and headache, restlessness and sleeplessness were the main symptoms present. In the main, these symptoms were of moderate severity. As a rule the weight was unchanged. Three patients had lost weight; one had gained. The average weight for 9 cases in which figures were available was 123 pounds. The average metabolic rate was 103; pulse rate 101; blood pressure 119–73. Frontal headache was a definite complaint in every case but one in which this symptom was present. Exophthalmos was present in two cases.

Three patients gave a history of recurring clinical hyperthyroidism. The most clear-cut example occurred in a nurse, aged 30, who developed nervousness, fatigue, tachycardia and insomnia every two or three months. These symptoms would be present for one to two weeks, and then clear up following increased rest.

The average duration of symptoms was 3.3 years. The average age of this group was 30.7 years. Bilateral partial thyroidectomy was done in 16 of the 17 cases; the right side only was partially resected in one case. In no case was an intrathoracic extension noted.

TABLE I (GROUP 1)
Pre-operative Findings

Number of cases	17
Average duration of symptoms	2.3 years
Average age	30.7 years
Average metabolic rate	103
Average pulse	101
Average blood pressure	119/73

Nine of the patients, or 53.1 per cent, were relieved of their complaints. Six others, or 35.4 per cent, were improved; 2, or 11.5 per cent, were unchanged. The average post-operative metabolic rate was 101; pulse rate, 88; and blood pressure, 109/75. The pulse pressure was decreased from 46 to 34 mm. of mercury. Most of the patients gained weight, the average gain being six pounds.

* Read at the meeting of the American Association for the Study of Goitre, at Cleveland, O., June 7, 1934.

TABLE II (GROUP 1)

Post-operative

Clinical cures	9	53.1 per cent
Improved	6	35.4 per cent
Unchanged	2	11.5 per cent
Average basal metabolic rate	101	
Average pulse	88	
Average blood pressure	109/75	
Average weight gained	6 lbs.	
Pulse pressure decreased	12 mm. of mercury	

GROUP 2. CASES PRESENTING NODULAR ENLARGEMENT OF THE GLAND

This group comprised 54 cases. Of these 53 were females. The average age was 38.6 years. Chart I indicates the number of cases in each decade. Twelve of the cases were from the private, 42 from the public, wards.

Here again no definite inciting factor appeared to be present in the majority of cases. A lump in the neck was noted by the patient in practically every case. Its average duration was thirteen years. Symptoms had been present on the average for three years.

Fatigue, palpitation, irritability, sleeplessness and restlessness, excessive perspiration, and flushing, in this order of frequency, were the main complaints. Approximately one-half of

CHART I CHART II CHART III

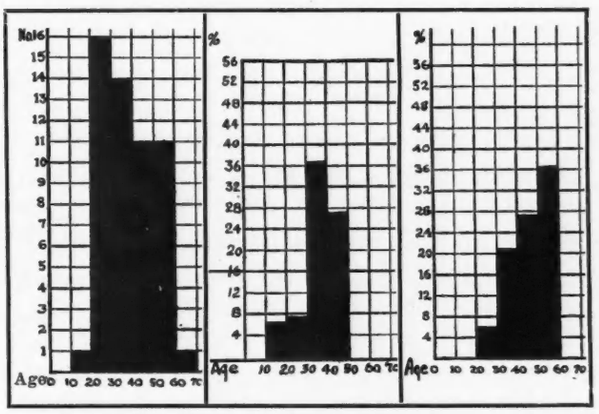


CHART I.—Chart showing number of cases of nodular enlargement in ten year periods.

CHART II.—The percentage incidence of œdema in Group 2.

CHART III.—The percentage incidence of histological evidence of degeneration in Group 2.

this group had lost weight, the loss varying from five to thirty pounds. The average pre-operative weight was 127 pounds; metabolic rate 107; blood pressure 146/83; and pulse 97. Exophthalmos was present in six cases.

Thirty-nine patients were subjected to a bilateral partial resection of the thyroid; 8 had one side only resected; 3 had removal of adenoma plus a portion of the other lobe; 4 had only the adenoma removed; 12 patients had large intrathoracic goitres. None of the glands removed showed any histological evidence of malignancy.

TABLE III (GROUP 2)

Pre-operative

Number of cases	54
Average duration of symptoms	3.0 years
Average age	38.6 years
Average basal metabolic rate	107
Average pulse rate	97
Average blood pressure	146/83

Thirty-six of these patients were cured, *i.e.*, 66.6 per cent. Ten were improved (18.5 per cent); 3, unchanged (5.6 per cent); 5 could not be traced in absolute detail. The average post-operative metabolic rate was 102, pulse rate 81, and blood pressure 137/81. The average pulse pressure had thus decreased 7 mm. of mercury. A gain in weight was noted in the majority of cases, the average being 11 pounds. No patients developed myxœdema.

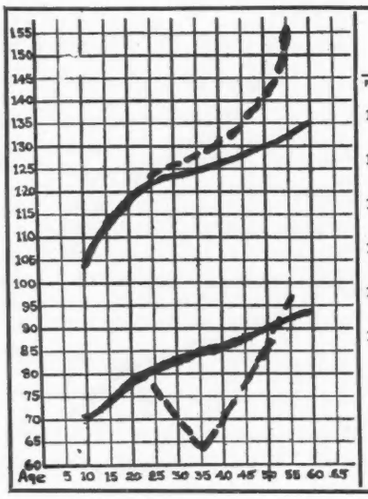
TABLE IV (GROUP 2)

Clinical cures	36	66.6 per cent
Improved	10	18.5 per cent
Unchanged	3	5.6 per cent
Not traced	5	
Average basal metabolic rate	102	
Average pulse	81	
Average blood pressure	137/81	
Average weight gain	11 lbs.	
Pulse pressure decreased	7 mm. of mercury	

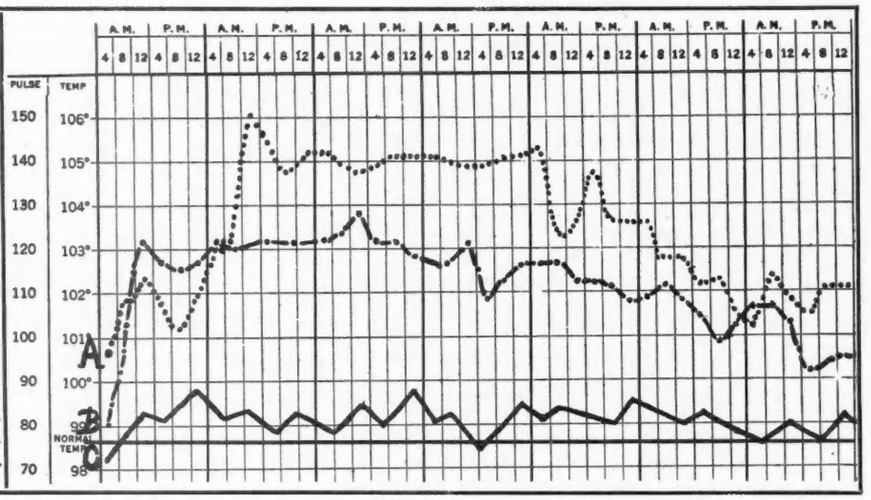
This group of cases was studied further by dividing them into ten year age-groups. Graph 1 gives the curves for the normal systolic and diastolic blood pressures, from figures given by Mosenthal, compared to the average blood pressures in the age groups studied. It will be noted that the average systolic pressure in the goitre group is higher than normal, and increases in direct proportion to the increased age. The pulse pressure is also greater than normal.

Œdema unexplained by other causes was taken as an index of cardiac insufficiency. The percentage incidence of such œdema increases in the cases over 40 years of age (Chart II). May this not mean that the thyroid dysfunction is the real cause of the cardiac insufficiency? It was thus found more commonly in the fourth and fifth decades than in the second and third.

Chart III indicates the percentage of glands showing histological evidence of degeneration in each decade. As will be seen, and as would be expected, a steady rise in incidence is seen with the advancing age of the patient.



GRAPH 1.—Curves showing systolic and diastolic pressures at different ages. Continuous line —— normal (Mosenthal). Broken line - - - - for patients in Group 2 in this series.



GRAPH 2.—Graph showing the pulse curves following operation. A For Graves' disease, basal metabolic rate, 143 per cent. B Clinical hyperthyroidism, basal metabolic rate, 96 per cent. C Total thyroidectomy for myocardial failure, basal metabolic rate, 95 per cent.

While the numbers in Group 2, that is patients with nodular glands having had different types of operation, is not sufficient to warrant drawing a definite conclusion, it would seem that if operation be undertaken a bilateral partial resection should be done. This opinion is based on the fact that the greatest percentage of clinical cures followed this procedure. This may be explained by the fact that histological study of the tissue removed has shown pathological changes in the gland surrounding the adenoma.

The immediate alteration in pulse rate following partial thyroidectomy gives some indication of the degree of toxicity present. Graph 2 shows the pulse curves following operation for Graves' disease, for nodular goitre, in a patient having a basal metabolic rate of 96 with clinical hyperthyroidism, and total thyroidectomy for myocardial failure. It will be seen that the first two curves show the same reaction, varying slightly in degree, and are totally different from the response shown in the curve following total thyroidectomy.

There is nothing definite at present in the literature as to the life expectancy of individuals having adenomatous goitre. Eberts[4] states that at least 25 per cent will become toxic, that others will develop pressure symptoms, and a few will become malignant. In our practice, over a period of ten years, 4.5 per cent of nodular goitres were malignant. Rendall Short[5] points out that a few may develop myxœdema. The percentage of patients harbouring a nodular goitre and living to old age without developing symptoms referable to the goitre is unknown.

From the above study it would appear that patients may suffer from clinical hyperthyroidism in the presence of a normal basal metabolic rate. This clinical syndrome has been peculiarly a disease of females in this series. It exists much more commonly in the presence of a nodular goitre. Whereas there were 17 cases in which the gland was diffusely involved, there were 54 cases in which it was nodular. Further, the percentage of clinical cures, as evidenced by amelioration of the symptoms for which the patients sought relief, was much higher in the group with nodular goitre. This serves to put one doubly on guard before diagnosing a hyperthyroid state in a patient with a diffusely involved gland and a normal basal metabolic rate. It is obvious, of course, that in no patient should a diagnosis of clinical hyperthyroidism be made in the presence of a normal basal metabolic rate until a most careful and thorough investigation fails to reveal any other organic or psychological basis for the patient's ill health. That errors will be made and disappointing results obtained seems to be inevitable, despite the most painstaking and careful investigation. However, if one denies the existence of clinical hyperthyroidism in the presence of a normal basal metabolic rate in this group of 71 pa-

tients, there would still be 45 patients who would be a total economic loss and who now are cured; there would be 16 patients who would be less effective than they are if no operation had been undertaken; and, fortunately, in this series none is worse, and there was no mortality. This conception of a clinical state would seem to justify itself by these results. It offers to a group of patients with whom we are all familiar a possibility of cure without risk to life and without the possibility of being made worse.

CONCLUSIONS

1. Clinical hyperthyroidism does occur in the presence of a low or subnormal basal metabolic rate.

2. It is commoner in patients with nodular goitre.

3. The frequency of degenerations in nodular goitres increases with age.

4. The systolic blood pressure in patients with nodular goitre is higher than in normal individuals, and the difference increases directly proportional to the increase in age.

5. Cardiac insufficiency was present in a much greater number of patients with nodular goitre after forty than before that age.

6. Bilateral partial resection of the thyroid would seem to be the operation of choice in patients suffering from clinical hyperthyroidism associated with a low or subnormal metabolic rate.

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THE SIGNIFICANCE OF THE POST-OPERATIVE THYROID REACTION

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IT is well known that very commonly serious and at times fatal reactions follow partial removal of the thyroid gland, ligation of thyroid vessels, radiation, or even hot water injection of the thyroid, in the treatment of exophthalmic goitre. Mayo and Boothby[1] state that the most disturbing factor from a surgical point of view is the ease with which a so-called post-operative crisis is initiated, to which the patient succumbs in from 18 to 24 hours. This intensification is so incompletely understood that no surgeon fails to be conscious of his limitations in the anticipation, prevention, and successful treatment of the more serious manifestations. In the early days of pre-operative iodine treatment it was felt that post-operative crises were prevented, but many fatal reactions occurring since, uncontrolled by Lugol's solution, make one feel that not only was iodine treatment useless but even definitely harmful. Jackson[2] has noted the stormy convalescence of some "hyperthyroid patients" who before operation had received iodine.

The post-operative reaction consists of a definite intensification of features previously present in lesser degree, commonly accepted as an expression of an altered or increased activity of the thyroid gland, and hence as a definite indication for the removal of such tissue. The reaction occurs regardless of the skill of the surgeon, the care with which the anæsthetic is chosen and administered, and the preparation of the patient. Variations in the intensity of the reaction occur. After thyroidectomy in patients in whom no evidence of so-called "hyperthyroidism" has been demonstrable before operation are found major and minor expressions of this reaction. These are a direct result of removal of thyroid tissue from the organism. Segall and Means[3] have shown minor aggravations to be associated with increases in pulse, temperature, and basal metabolic rate, with other deviations from normal observed by the patient. The tendency, expressed more clearly in the severe reactions, is towards a more complete development of the disease process, with a smaller quantity of thyroid tissue present in the organism.

The minor states show increases in respiration, pulse, temperature, and metabolic rate,

an increased secretion of mucus in the respiratory passages, anorexia, nausea, vomiting, some restlessness, sweating and sensations of warmth. Because of the slight degree of these changes little attention is paid to their significance. The more severe grades of the reaction show a greater rise in pulse, respirations and temperature, with even hyperpyrexia, cardiac arrythmias, distressing nausea, uncontrollable vomiting and diarrhœa, abdominal pain, marked stimulation and restlessness, even delirium, a rapid course, and the rather constant autopsy findings of congestion and œdema of the lungs, with or without bronchopneumonia or pleuritis. A rising blood urea, with oliguria or anuria, indicates how severe is the process occurring in the organism after removal of part or most of the thyroid gland. Oxygen is of definite value, as Haines and Boothby[4] have shown, but usually is not given early enough.

After removal of part or most of the thyroid gland, ligation of thyroid vessels, radiation, or hot water injection, measures which in common lessen the functional capacity of the thyroid gland, it is astonishing only when considered with former concepts of thyroid physiology that when a large mass of thyroid tissue is destroyed or removed phenomena attributed to an increased activity of the gland should be intensified. The hypotheses concerning the activity of the thyroid in this disease and the primary effects of thyroidectomy do not accord with the facts. It seems obvious that if the removal or destruction of a portion of thyroid tissue produces such serious manifestations of the so-called hyperthyroid state, then these measures can in no way be considered as adequate means of relieving the situation. When partial thyroidectomy produces a serious reaction, relieved by oxygen and other aids to treatment, then it is to oxygen and the other methods that credit must be given for the return of the patient to a more normal situation. The result desired by the patient is a suppression, not an aggravation, of the characteristics of the so-called hyperthyroid state. The significance of the post-operative reaction has been overlooked. It is certain that its nature and its relations to the previous state of the patient have not been understood.

The variable picture of the so-called hyperthyroid state is associated with certain basic phenomena considered to be due to the increased activity of the thyroid gland. The common appearance of a reaction following partial thyroidectomy in patients presumed to be suffering from an increased activity of the thyroid gland, occurring shortly after the functional capacity of the thyroid gland has been suddenly reduced, does not accord with such a conception. However an adequate sudden reduction in the functional capacity of the thyroid gland produced by partial thyroidectomy would intensify the features already present due to a lessened activity of the gland, or if not present tend to induce them. The statements of Bier and Roman,[5] who speak of the post-operative reaction as a hypothyroxæmic shock, and of Ewald,[6] who suggests that sudden deprivation of thyroid secretion, rather than flooding of the organism with secretion, as was formerly held, may be the cause of death, show a reversal of the ideas still maintained elsewhere that these reactions are associated with an increased thyroid activity. They indicate an appreciation of the state of thyroid failure produced by operation, even though they do not include the pre-operative state as an expression of failure of thyroid activity, produced by qualitative cell changes.

It has not been realized that the relief of the so-called hyperthyroid patient has been accomplished without any interference with thyroid tissue, with and without operations concerning other ductless glands. The performance of a partial thyroidectomy at a time when, whether estimated by laboratory or clinical examinations, the condition of the patient is becoming worse, has long been known to be unwise, as almost certainly a fatal aggravation will occur. If hypotheses were correct as to the nature of the disturbance of thyroid activity in this disease, this should be the period in which the most brilliant surgical results should be obtained. But if the so-called hyperthyroid state be an expression of the defective activities of the thyroid gland, occurring as a single or associated component of a clinical process, then the post-operative reaction may be understood as a suddenly produced quantitative aggravation of the thyroid state, due to thyroid failure, intensified by a significant reduction in the functional capacity of the thyroid gland. The phenomena of thyroid failure are intensified by a significant reduction in the functional capacity

of the thyroid gland. No surgeon, seeing his patient in a post-operative reaction following thyroidectomy, considers that he should return his patient to the operating theatre and remove the remnant of the gland.

In the treatment of disease a slight fever is an indication for the use of methods that tend to reduce the fever and other expressions of the process. Thyroidectomy produces a definite intensification of the condition of the patient. A procedure that reduces the functional capacity of the thyroid gland brings about an undesirable condition, an aggravation of a process considered due to increased thyroid activity. A serious post-operative reaction, the result of thyroidectomy, cannot relieve the patient. Some common factors have been overlooked. Studies in adrenal and parathyroid physiology afford an interesting comparison with the immediate effects of thyroidectomy. In the presence of tetany, gastric, infantile, or the type associated with thyroid operations, no one would suggest removal of parathyroid tissue. Should surgical methods be considered, it would be in regard to a transplant. It is known that manifestations of tetany, associated with failure of parathyroid activity, are intensified by removal of any or more parathyroid tissue. A qualitative decrease in parathyroid activity would be intensified by an operation which produces a quantitative reduction in glandular capacity. If quantitative reductions in glandular capacity were present, producing tissue-expressions of glandular failure, they would be intensified by a significant quantitative reduction in glandular tissue. The stimulus required to produce the intensification, whether the primary basis of the disease process was qualitative or quantitative, must be adequate before intensification due to a later qualitative or quantitative reduction in glandular capacity impresses its effects upon the course of the already present disease.

While removal of one or two parathyroid bodies may be unattended by the appearance of tetany, the stimulus being inadequate, such tetany as usually occurs after the removal of the third parathyroid body is intensified by the removal of the fourth lobe (MacLeod[7]). A quantitative reduction in glandular capacity must be adequate to produce the tissue expressions of glandular failure. An additional quantitative reduction in the capacity of the same gland must also be adequate to intensify the phenomena already present due to glandular failure. This has been well demonstrated for the pancreas in the past, especially in relation to the islet tissue. The less the mass of active gland tissue, the more intense the phenomena due not to increased activity but to defective activity. A specific disturbance in the activity of the organism is intensified by the removal of glandular tissue. Just as this disturbance, specific for the pancreas and the parathyroid tissues, is related to defective glandular activity, so are the intensification phenomena related. When a specific disturbance in an organism is intensified by a reduction in the quantity of gland cells, which suddenly or gradually have been subjected to an adequate decrease in functional capacity, then such disturbance, identical with the phenomena of defective glandular activity produced by operation, is an expression of the failure of activity of the gland concerned.

Applying this to the thyroid, one finds that there is no essential difference in the patient's state before operation and afterwards. The same phenomena are present, and are often more marked after operation than before. Although the course tends more quickly towards failure no new phenomena may be found. The intensification is identical with the pre-operative state. The condition produced by a quantitative reduction in thyroid capacity is identical with that considered due to thyroid over-activity. As the intensification is the result of the defective functional capacity of the thyroid gland, so is the pre-operative state, the basic phenomena related to the thyroid occurring in the broad picture of hyperthyroidism.

Applying evidence derived from studies concerned with parathyroid activity, one reaches a conclusion opposed to common belief, that the so-called hyperthyroid state, intensified by removal or destruction of thyroid tissue, which to an already present qualitative or quantitative reduction can add a sudden quantitative reduction, is a manifestation of the lessened activity of the thyroid gland. The relief of this disease by methods that ignore the thyroid can be better appreciated.

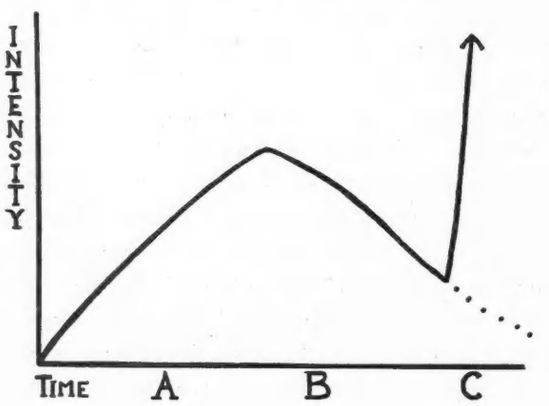
In animals unilateral adrenalectomy produces some slight disturbances, intensified fatally by removal of the second gland (MacLeod[7]). One sees again that as for the parathyroid, pancreas

and thyroid, in the presence of a state due to defective activity of a ductless gland, the less the mass of active gland tissue present in the organism, the more intense the phenomena of lessened activity. The phenomena observed after adrenal removal have been noted previously in patients who presented evidences of adrenal lesions. Surgery has avoided the removal of adrenal tissue in these patients, realizing what has not been emphasized for the thyroid gland, that the manifestations of defective activity are intensified by removal of active gland cells.

The more thyroid that is removed, the worse becomes the so-called hyperthyroid patient. Bier and Roman[5] have noted that the post-operative reaction is less after the removal of part of a lobe than after a subtotal thyroidectomy. They observed a direct relation between the quantitative reduction in thyroid capacity and the degree of the post-operative reaction, a condition which accords with the conception of thyroid failure. The recollection that severe grades of the so-called hyperthyroid state exist in patients in whom the thyroid gland is neither visible nor palpable is significant, as failure is more closely associated with small thyroids than with larger ones.

The application to the thyroid that the basic phenomena of Graves' disease, believed to be due to an increased activity of the thyroid gland, are due to thyroid failure, modifies conceptions of the process. The post-operative reaction is a definite intensification of a state due to a lessened qualitative or even quantitative activity of the thyroid gland. To an already present set of functional and structural changes, due to a qualitatively defective thyroid capacity, or in instances in which thyroid epithelium is decreased to a quantitatively defective thyroid capacity by operation, are added the effects due to a significant sudden quantitative reduction in thyroid capacity, producing an intensification of the condition of the patient. The patient who shows evidence of thyroid failure has his or her condition aggravated when additional thyroid failure is produced by operation or other methods.

Commonly accepted ideas have failed to explain the nature of the post-operative thyroid reaction and its relation to the previous state of the patient. The failure of methods of treatment is well known. The commonly held opinion is that in Graves' disease the thyroid is over-active, but the post-operative reaction reported by Kocher[8] in 39 of 55 thyroidectomized patients, and by many others since, persists as an obstacle in that direction. The interpretation presented here indicates why the reaction should occur and why it should be more intense in the severe forms of the disease. No increment of failure can be produced by the removal of a gland that has failed completely, so that the reaction can be absent for this cause alone. The reaction is evidence that the thyroid has not failed completely and is capable of a return to more normal activities. The post-operative thyroid reaction can be realized not as a mysterious inexplicable phenomenon but as a tendency definitely predictable in any series of cases, having a direct relation to the amount of gland tissue removed as well as to the condition of the patient. Variations in the intensity of the reaction are to be expected in regard to the previous state of the patient, the increment of thyroid failure produced by destructive measures, and to methods used in treatment.



A graph of the course of the disease indicates how operation causes the development of a tendency opposed to that required for relief. Upward movement of the graph indicates an increase in the intensity of the disease, downward movement, relief. The first rising portion of the graph A indicates the development of the disease from its onset to a certain intensity; the falling portion, a degree of restitution towards normal; the third sharply rising portion C indicates the constant tendency developed by thyroidectomy and other methods, which is opposed to the required tendency shown by a

falling dotted line. In no instance is this contrary tendency helpful to the patient.

An engineer or chemist finding such an expression of a contrary reaction would carefully check his ideas, his procedures, and his material to ascertain where the fault lay. He would know that something was wrong and would try to find out the reasons why failure occurred. Modern surgery has ignored the common definite indicator of failure of concepts of thyroid activity provided almost universally in the last few decades by the post-operative thyroid reaction. The intensity of this reaction does not change the appreciation of its significance. The statement that a patient who has passed through a severe thyroid reaction has been relieved by a procedure that has obviously made him worse is not according to fact. The same cause cannot have two opposite effects.

SUMMARY

1. A consideration of the effects of partial thyroidectomy in Graves' disease, compared with evidence concerning the activity of other ductless glands, leads to the conclusion that the so-called hyperthyroid state is an expression of lessened activities of the thyroid gland.

2. The post-operative thyroid reaction which follows partial or complete thyroidectomy, ligation of thyroid vessels, hot water or alcohol injection, or radiation of the gland, occurs because to the tissue expressions of thyroid failure, due to qualitative or quantitative cellular changes in the thyroid gland, there is added a significant increment of thyroid failure, which, when adequate, intensifies the clinical phenomena already present due to thyroid failure.

3. The post-operative reaction conforms to the general principle that the less the mass of active gland tissue in the organism, the more intense the phenomena of defective glandular activity.

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RETROPERITONEAL ABSCESS, WITH DISCUSSION OF A CASE

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THIS case was remarkable in view of the continuance (almost five months) of a temperature running up to 104°, and the great difficulty in diagnosis.

The patient, L.T., male, aged 32, a storekeeper, was of large, stout build. It was apparent from our later difficulties that it was this fat that held from us in its oily embrace the secret of our diagnosis. He was of medium height, weighing 230 lbs.

Previous history.—The right side of the abdomen had always bothered him more or less, even as a child. Four years previously he had been x-rayed for discomfort on this side and flatulent dyspepsia; nothing definite was found. In January, 1932, he was operated on for appendicitis. The pathological report was chronic interstitial appendicitis. The soreness and dyspepsia continued at times, although there was temporary relief. A few weeks before the onset of the symptoms he complained of feeling sleepy all the time. These symptoms were not enough to cause much trouble and were only recalled by the patient after he was better.

History of illness.—He first reported on July 25th, complaining of fever, malaise and nausea of fairly acute onset. There was no pain, but he had noticed the day before a definite pain across the back on lifting a heavy boat.

Examination.—Pulse, 100; temperature, 104°; respirations, 24. There was deep tenderness over the gall bladder area. The white cells were 6,000. Differential count showed polymorphonuclears, 78 per cent; lymphocytes, 18 per cent; mononuclears, 3 per cent; myelocytes, 1 per cent. Many of the polymorphonuclears were young forms and, with the myelocytes, were evidence of marked activity. All other tests were essentially negative.

During the next three weeks every cause of continued fever, remote or likely, was thought of and tests that might help were applied. Our only guide, the pain in the right subcostal region, was often indefinite or absent. The blood was examined for typhoid, paratyphoid A. and B., undulant fever, tularæmia. The Wassermann test, van den Bergh test, icterus index, and blood culture were repeatedly done.

On August 20th the white cells had risen to 12,000 and the reds were down to 4½ million per c.c. The temperature was still at the same high level, but the nausea had increased and there was vomiting at times. I quote from Dr. Conrad Geggie's notes at this time. "Blood agglutination tests and cultures have again been repeated; his liver and kidney functional tests are within normal range. X-ray signs of sub-diaphragmatic abscess are absent. The barium enema shows nothing abnormal.

A Graham Cole test however showed a gall-bladder that did not fill, nor did it show on any of the films.''

In view of this it was decided to do a laparotomy, remove the gall bladder, and, if necessary, explore. Under spinal anæsthesia the gall bladder was removed and the whole abdomen explored—the liver above and below, and every organ in turn. Apart from the gall bladder, there were a few dense adhesions about the old appendix scar, which were not disturbed, and a right kidney considerably larger than the left. This was of normal shape and density and gave the impression of being congenitally large. The pathological report on the gall bladder was, ''Chronic catarrhal cholecystitis with acute exacerbation''.

The post-operative recovery was normal and the temperature became normal within 36 hours, together with the pulse and respirations. This apparent recovery continued for three days, when the temperature, pulse and respirations started to climb again and were soon at their old level. The temperature as before was of the continuous type. The vomiting however had ceased, the general condition seemed better, and in spite of a temperature of 104° the patient would be found eating a hearty meal.

Further tests were now applied or repeated. The chest and heart were again x-rayed, the urinary tract cystoscoped, and uroselectan given. The lower pleura, liver, and subdiaphragm were explored with a cannula in a dozen places, and nothing obtained except a small quantity of blood, which was in each case negative on culture. The urine showed a trace of albumin, a few leucocytes, a number of red cells and an occasional hyaline and granular cast; the non-protein nitrogen was a little up, to 41 mgm. per cent, and blood chlorides to 495 mgm. per cent. The blood pressure was 110/75.

On September 13th his red cells had decreased to 2,780,000; his white were 12,000. At this time the case was at its most baffling stage. Every organ in the body seemed to be normal, and yet we had, to recapitulate, (1) seven weeks of high fever; (2) a leucocytosis and secondary anæmia; (3) evidence of chronic cholecystitis, with acute exacerbation, with (4) fall in temperature and improvement of symptoms temporarily on removal of the gall bladder. All one could say from this was that there was a marked inflammatory process somewhere, presumably not localized as an abscess. This latter possibility seemed to be ruled out by the length of the illness without localizing signs. The right kidney region was under suspicion because of its enlargement, right-sided pain, and increased non-protein nitrogen. Against this however, and this too is significant, the deepest pressure in the right sub-costal angle did not give rise to any pain and in this particular there was no difference between the two sides. Our hypothesis at this time was that from a primary gall bladder focus a mild septicæmia had developed. The germ causing the septicæmia must have been of a mild type since we had no evidence of metastatic infection and no petechiæ or rigors. Since 80 per cent of gall-bladder infections are due to the *B. coli* and this organism could cause just such a mild septicæmia we assumed it to be the probable cause.

On September 14th two other symptoms presented themselves, namely, a dull pain over the right iliac fossa and a numbness over the thigh. He later stated that this latter symptom had been present for two or three weeks, but he had not thought it worth mentioning since it was slight, and he put it down to a soreness following an injection of serum in that region. Examining this further, we found an area of anæsthesia to all forms of sensation on the outer part of the right thigh. This corresponded to the area of distribution of the lateral femoral cutaneous nerve. The area in the right iliac fossa showed hyperæsthesia, and the slightest pressure would make the patient jump. On the other hand there was no deep tenderness. Mentally, too, there seemed to be a change. He had difficulty finding the right words to express himself, and his speech was correspondingly slow and difficult. At the same time the normal irritability of a sick man seemed to be much more pronounced. These symptoms proved afterwards to be due to nothing more than the weakness and exhaustion of a prolonged fever, but at the time our thoughts immediately turned to the central nervous system. A cerebrospinal fluid count, bacteriological examination, and chemical analysis however, proved to be normal. We were again in a *cul-de-sac*. A few days later there was definite weakness of the flexor muscles of the thigh. The knee jerk was also decreased on this side. An Arneth count taken at this time showed a decided shift to the left; in the first group were 27, in the second 49, in the third 21 and in the fourth 3—further proof of an active inflammatory process somewhere.

The case dragged on till September 29th without giving us any more clues. In the meantime we were working on our provisional diagnosis of a septicæmia and administering vaccine, ultra-violet rays and blood-forming drugs and food. On this date the blood culture proved positive for *Staph. albus*. This, of course, confirmed our general diagnosis, except in the organism found. It did not however confirm the gall-bladder as the focus or give us any idea from whence the germ had escaped. Further, as *Staph. albus* is a common skin contaminator, we could not as yet exclude the skin as a possible source. Another culture, taken on October 4th with all possible precautions against contamination, was also positive. With definite evidence of a septicæmia it was thought that these changes in sensation might be due to a localized neuritis. On the other hand, a kidney lesion or one in the kidney area had still to be kept in mind. Again putting us off this scent was the entire lack of tenderness in the subcostal angle.

Around October 9th, nearly ten weeks after the onset of the illness, the diagnosis was finally cleared by the occurrence of lumbar œdema. This had been preceded and was followed by an increased intensity of all the symptoms. The temperature kept at a slightly higher level (104°) instead of 103°; sweating was more marked, the pulse higher and weakness more apparent. Whatever the origin, it was now evident that we had a localized inflammatory mass in the lumbar region.

Under spinal anæsthesia a right kidney incision was made on October 13th. About a pint of whitish pus was found and evacuated in the retro-peritoneal area. The cavity containing this pus would admit the whole hand with ease, and extended slightly above the upper pole over the lower limits of the attachment of the diaphragm, and to a greater extent below the lower pole of the kidney on this side. No focus could be discovered. A drain was inserted in the incision, and the wound stitched in layers around this. After twenty-four hours the temperature suddenly dropped to normal and all the symptoms rapidly subsided. The wound however continued to drain copiously a clear serous fluid. Swabs taken of the pus showed *Staph. aureus*. The whole wound became infected mildly and discharged a little pus, but gave rise to no pain or to any anxiety.

After such a prolonged and serious illness, this sudden and dramatic recovery was a great relief. We were however soon to be rudely shaken out of our complacency. On November 5th the temperature suddenly shot up again to its former level, showing no tendency in the next few days to subside. Corresponding to this rise there was an increase in the amount of serous discharge. We then decided to explore the old wound again, either for pocketing or on account of the possibility of another focus having been missed. On November 10th, under ether, it was found that the old abscess cavity had become walled off completely from the exit tract and was again full of pus and seemingly as big as before. In order to make the drainage tract as short as possible an extra tube was carried, this time directly posterior, through the quadratus lumborum at the outer edge of the psoas major.

The patient's recovery from this operation was far more stormy. For a while his general condition seemed worse. The white cells were up to 17,000 and still exhibited many young forms. The secondary anæmia was also very marked. A blood culture, however, was nega-

tive. A swab taken of the pus at this time showed *S. hæmolyticus* and *Staph. aureus*. It was evident that we had a secondary infection with a virulent streptococcus, and, in the absence of other evidence, this would account for the present severity of symptoms. The numbness in the right thigh remained prominent, and he now began to complain of a similar numbness in a corresponding area of the left thigh. In order to rule out the possibility of there being a bilateral abscess the retroperitoneal area on the left side was explored with a needle and found negative. The whole of the right side of the abdomen remained tender, especially under the ribs, but the hyperæsthesia of the lower iliac region remained definite in contrast to the vague pain and tenderness of the rest of that side. A direct blood transfusion was given at this time and an autogenous vaccine prepared.

On November 20th the temperature again shot up, but immediately subsided on clearing out the posterior tube and aspirating about 40 c.c. of pus which had again got blocked in the cavity. In order to prevent this occurring again a catheter was passed up the wound, twice daily, till it was felt to impinge against the kidney and the pus aspirated. The daily amount of pus aspirated did not seem to grow much less from day to day. A further x-ray of the spine again excluded this as a possible focus. The transfusion was again repeated and the patient slowly but surely began the uphill grade of convalescence. About the middle of December the fluid aspirated became a clear serum and at the end of December completely ceased.

DISCUSSION

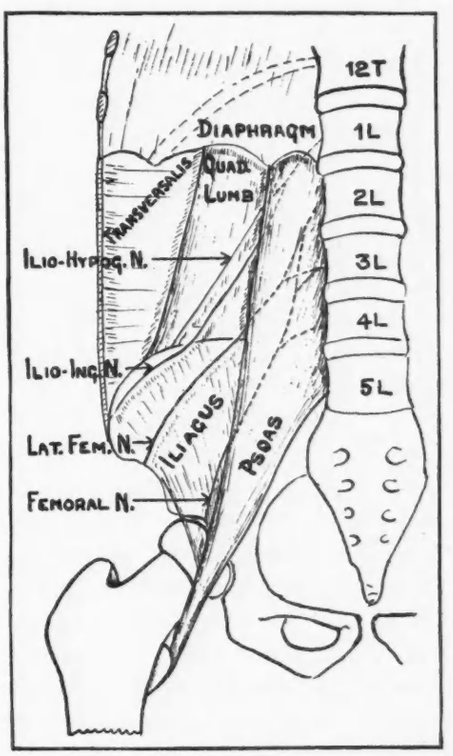
The case given above illustrates two common features of retroperitoneal abscess, namely, the difficulty of diagnosis and the obscurity of the causal condition.

The difficulty of diagnosis.—This is confirmed by other observers. Hamilton Bailey, quoting Habien[1] says "The diagnosis of perinephric abscess is often most difficult. In 43 cases the diagnosis was not made for (on an average) five weeks." In our case the difficulty was greatly accentuated by the layer of fat preventing the appearance of the diagnostic lumbar swelling and also providing probably a wide retroperitoneal area, which could readily be dilated without pressure to accommodate a large quantity of pus.

A localized inflammatory mass gives away its location: (1) by the appearance of surface swelling and redness; (2) by the appearance of pain, localized or referred; (3) by displacement of neighbouring organs; (4) by interference with the function of the organ or adjacent organ involved; (5) by irritation of neighbouring organs. Analyzing these in relation to retroperitoneal abscess we find that the swelling and redness are due to the underlying inflammation spreading to the skin and subcutaneous tissues. This would take a long time to occur, since the abscess lies under strong fascial layers and is separated by large muscles from the surface. In the case quoted the appearance of swelling did not occur till the 10th week.

Pain is due to the irritation of sensory nerve endings by the inflammation itself and accompanying œdema; if the latter, this causes tension. It is therefore dependent on the presence of sensory nerve endings and tension. Both these factors are absent in a retroperitoneal abscess. There is no mechanical limitation to the exudate, since the anterior wall and sides may be displaced to any extent; sensory nerve endings are absent.

The only organs which could be moved are the colon and kidney, and since these are mobile,



anyway, their displacement is of no significance. This is in marked contrast to a collection of pus in the subphrenic area or pleural cavity where displacement of important organs is readily recognized and is diagnostic.

Interference of function cannot occur, since no organ is concerned and neighbouring organs are protected to a large extent by fascial layers and peritoneum.

Irritation of neighbouring structures is the one condition that may give us valuable information. On the anterior wall we have abdominal organs protected by peritoneum and subperitoneal fat. These then will not be affected, but on the posterior wall lie the lumbar

plexus and its branches. The lumbar plexus itself lies in the substance of the psoas major and will therefore be protected from any injury. Certain of its branches however, escape from its protection and, lying under the psoas fascia, cross a certain extent of the posterior wall of the abscess before they reach their destination. The branches of the lumbar plexus thus exposed are, in the extent of their exposure: first, the lateral femoral cutaneous nerve; secondly, the ilio-hypogastric, and ilio-inguinal; and thirdly, the femoral.

The lateral femoral cutaneous nerve emerges from the lateral border of the psoas major and, passing outward, crosses the iliacus muscle obliquely toward the anterior superior spine. Just below this it crosses under the inguinal ligament and thus enters the thigh. During the whole of its course from psoas to inguinal ligament the nerve is only separated from a retroperitoneal abscess by the iliac fascia. Irritation of this nerve, by reason of its anatomical position, would be the first to occur. Had we realized it in the case reported above, this was our first diagnostic sign, and had we recognized it, it would have shortened the period of diagnostic doubt by several weeks. The ilio-hypogastric nerve emerges from the upper part of the lateral border of the psoas and crosses obliquely behind the kidney and in front of the quadratus lumborum to the iliac crest, where it perforates the abdominal muscles and divides into lateral and anterior cutaneous branches. The lateral branch supplies the side of the buttock and the anterior supplies the skin of the abdomen above the inguinal ligament. In the case reported the area of skin supplied by the lateral branch was definitely hyperæsthetic. This branch is similarly exposed during its abdominal course from the lateral border of the psoas to its exit at the iliac crest.

The ilio-inguinal nerve did not show signs of irritation in this case, but, theoretically, a retroperitoneal abscess could affect it. It emerges from the lateral border of psoas just below the ilio-hypogastric and passes obliquely across the quadratus lumborum and the upper part of the iliacus and perforates the abdominal muscles near the iliac crest. Irritation of this nerve would cause disturbances of sensation in the skin of the scrotum and the upper and medial part of the thigh. The femoral nerve lies mostly, in its pelvic portion, in the substance of the psoas and emerges at its lateral border low down. From here it passes down between the psoas and iliacus and may be exposed for a short distance at this part of its course before it emerges from under the inguinal ligament to the thigh. Its irritation may have accounted for the weakness of the flexor muscles and the weakness of the patellar reflex noticed on this side. None of the other branches of the lumbar plexus would be affected, as they are too near the midline.

The obscurity of the causal condition.—Before going any further one should explain the difference between the terms retroperitoneal and perinephric abscess. The latter term applies to abscesses in this region arising clearly from the kidney, whereas the term retroperitoneal emphasizes that abscesses in this region may occur from extra-renal causes. There is strictly no anatomical difference between them.[2]

On looking up the recorded cases of retroperitoneal abscess one is struck with the frequent repetition of "Cause unknown". One finds practically every organ in the abdomen, as well as injury, given as possible causal factors. Some authors would classify these into primary, renal and contiguous causes, putting into the primary class all those cases where no cause was found, and into contiguous all other cases where any other organ than the kidney was diseased. One is struck at the outset, however, by the close similarity between this condition and subphrenic abscess. In the case reported the abscess had already extended between the kidney and the lower part of the diaphragm and was therefore partially subphrenic. In each case there is a large enclosed area containing purulent fluid, formed entirely apart from any organ, and in what is normally a closed space, though one capable of distension. It is logical to assume that the causal factors of the one are of the same type as the other, and since subphrenic abscess is always produced secondarily to some diseased abdominal organ then retroperitoneal abscess is caused in the same way. It is easy to see, looking at it from this point of view, why subphrenic abscess is the most common. Most organs of the abdomen are surrounded by peritoneum, *i.e.*, they are intraperitoneal; most subphrenic abscesses are also intraperitoneal. Most inflammatory processes extending from abdominal organs then would, other things being equal, take the

easier anatomical subphrenic intraperitoneal position. Bernard,[3] in his classical study of subphrenic abscess, points out that the subphrenic retroperitoneal cellular space is continuous with the retroperitoneal cellular tissue, and by this route infection occurs from any retroperitoneal organ. Conversely, either a left or right extraperitoneal subphrenic abscess may extend into the retroperitoneal area and point in the loin. Further, these extraperitoneal abscesses are capable of enormous distension, as in our case, being unlimited, as are the intraperitoneal type, by newly-forming peritoneal adhesions. In no case is it suggested that abscess in this region is ever caused by anything other than direct infection. The retroperitoneal conditions from which infection may occur he classifies as follows: (1) kidney; (2) posterior perforating duodenal ulcer; (3) retro-colic appendicitis; (4) acute periostitis of lumbar vertebræ; (5) perforation of the common bile duct in its lower part; (6) suppuration in the head of the pancreas; (7) wounds and lymphatic infection; (8) colonic ulcers and cancer. It is interesting to note here that Bernard points out that, although the left retroperitoneal cellular issue is as abundant as the right, yet there is no large cellular space below the diaphragm on this side. Thus, when suppuration occurs here it shows a much stronger tendency to point in the left loin and at an earlier date.

The causal focus of a subphrenic abscess is generally clear, whereas it is not with the subperitoneal type. The reason for this will not be hard to find, since, if we accept the above reasoning, retroperitoneal abscess always occurs by extension from retroperitoneal organs and these will not give rise to symptoms so readily, for the very reason that they lie behind instead of being surrounded by the sensitive peritoneum. It is the irritation of the peritoneum and consequent adhesions which give rise to most of the pain caused by diseased abdominal organs. For example, disease of the kidney gives rise to symptoms more by disturbance of function, frequency and pyuria, than by pain, whereas with disease of the appendix or stomach, intraperitoneal organs, it is pain which is the prominent symptom. Disturbance of function may be absent or secondary. It would seem perfectly logical to assume that subperitoneal abscess forms secondarily by extension from diseased retroperitoneal organs in all cases.

What other explanations of this condition have been suggested? Some authors, as already has been mentioned, would classify some retroperitoneal abscesses as primary conditions. Analyzing this more closely, what possible means could there be of infecting this space? It is obvious that it could not be spontaneous. Presumably it must also be assumed that we have a mild blood stream infection from some quiescent but septic focus, which in turn has infected the retro-peritoneal cellular space. This, of course, is in line with the theory of infection of joints in arthritis and of apparently spontaneous inflammation of other organs. But these cases are only superficially parallel; the problem here is fundamentally different. In the one case we have an inert space filled with fat, and in the other we have an actively working organ with its intricate nervous and vascular control, and with its consequent liability to trauma induced during its activity. There is the same difference in liability to damage as there is, say, between a piece of iron used as a girder to support a factory building which will last indefinitely and that same piece of iron converted into the working part of the engine in that factory where it is subjected to the wear and tear of use. Again, what logical reason could be given for the infection of this particular mass of fat—in our own case there was probably another 100 pounds of fat in other parts of the body and none of it was infected. The only other similar case of fat infection with solitary abscess formation is that occurring as a subcutaneous abscess. This however is always preceded by injury, with loss of vitality of the fat and extravasation of blood, and it is this latter which is infected, probably again by direct infection from the overlying skin. Another possible parallel is that of osteomyelitis occurring from a mild blood stream infection, but here again there is associated injury and blood extravasation. The slightest injury in a stiff structure such as a bone would cause a rupture of the contained blood vessels. In the retro-peritoneal area, on the other hand there is nothing of a rigid nature, and it is impossible for an injury to affect such a well protected deep area without at first causing some obvious damage to the overlying structures. Strain, such as would

occur from lifting some very heavy weight, might conceivably cause a rupture of some of the fibres of the back muscles and consequent hæmorrhage and then infection. A resultant abscess in this case, however, would be in the muscle and under instead of over the psoas fascia. A primary cause of retroperitoneal abscess would seem illogical and improbable. For a retro-peritoneal abscess to be a primary condition then would seem illogical and improbable. Much more likely is it that these so called primary cases are cases where the causal factor cannot be found.

COMMENTS

It is fairly evident that the causal agent here cannot be definitely fixed. From the symptoms it is very probable that the abscess was present from the first, since these symptoms, with the slight difference after the operation, remained much the same from the beginning to the evacuation of the pus. There was a history of right-sided abdominal pain dating from childhood, and severe enough to warrant a gastro-intestinal series being done four years previously and an appendicectomy one year before. This seems evidence enough that one of the organs on the right side of the abdomen was diseased. The gall bladder would seem the likeliest, since we have definite evidence of an inflamed gall bladder with adhesions, with a gall bladder type of indigestion and some relief of symptoms after operation. The difficulty here is in the mode of spread to the retroperitoneal area, since the gall bladder is not retroperitoneal but is entirely surrounded by peritoneum. The only route open is via the lymphatics to the retroperitoneal parietal lymph glands, with abscess formation in these glands and subsequent rupture. This would be on a parallel with secondary abscess forming in the submaxillary glands from a primary tonsil infection.

The appearance of *Staph. albus* toward the latter part of the illness coincided with the increased severity of the symptoms, and would have resulted from a beginning breakdown of the patient's resistance, and almost certainly originated from the abscess. It is interesting to note that it was the *Staph. aureus* which was found at first on direct culture of the pus from the abscess. On this point Dr. R. M. Shaw, who handled most of the specimens at the Provincial Laboratory, has the following comment to make. "On some occasions the *Staph. aureus* fails to show its characteristic colour when first isolated. Although the organism isolated in both blood cultures appeared to us to be the *albus*, there is a possibility that had it been observed over a longer period of time it might have been classed as *aureus*. Since it was found twice in the blood in pure culture I think it only reasonable to assume that there was a blood infection. The diagnosis would have been cleared considerably had the bacteriology of the gall bladder also been studied. The finding of the *Staphylococcus* here would have been good evidence that the retro-peritoneal abscess was secondary to the diseased gall bladder."

The foregoing case illustrates the necessity of direct drainage. Owing to the deep situation of the abscess the tube should take the shortest route to the skin, which is posteriorly, directly through the back muscles. Further, as contrasted with kidney inflammation, tenderness in the back below the last rib may not be present, in spite of the large amount of pus present. The explanation of this almost certainly lies in the lack of tension of the peri-nephritis of retro-peritoneal abscess as contrasted with an inflamed kidney enclosed in its tight capsule.

It is difficult to account for the occurrence of anæsthesia of the opposite thigh corresponding with the area involved on the diseased side.

CONCLUSIONS

Retroperitoneal abscess could be diagnosed in the presence of the following evidence: (1) general signs of a collection of pus, with, (2) exclusion of all other causes of continued fever; absence of all localizing signs, disturbance of function, displacement of organs, localized pain, swelling, excepting (3) evidence of irritation of branches of the lumbar plexus, particularly the external cutaneous nerve of the thigh and ilio-hypogastric nerve.

This case was worked out in collaboration with Dr. Conrad Geggie, of Edmonton, to whom I acknowledge my thanks.

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TORSION OF THE OMENTUM

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TORSION as a cause of acute intra-abdominal disease occurs with sufficient frequency to demand attention. Almost every organ in the abdomen has been known to be involved, including the spleen, ovary, gall bladder, loops of small and large intestine. A number of cases of torsion of the whole mesentery in infants are on record, one of which it was my privilege to report in this *Journal* several years ago.[1]

Torsion of the omentum, while relatively rare, is being reported with increasing frequency in the literature. Jeffries[2] in 1931 reported 4 cases, and, in reviewing the literature, noted that 169 cases had been recorded up to that time, 147 of them being in association with right inguinal hernia. I have been able to find reports of 15 additional cases, 8 reported by Wallace and Miller[3] and 7 by Farr and Bachman.[4] I wish to add notes of two cases upon which I have recently operated.

CASE 1

Miss O., aged 30 years.

History of illness.—She complained of pain in the abdomen, more severe in the right lower quadrant, of about 24 hours' duration. She had some nausea but no vomiting. She had a temperature of 100°; pulse, 80; and a white blood count of 12,000.

Examination.—She was found to have a right inguinal hernia which was not tense nor tender, and the contents of which appeared to be perfectly reducible. The abdomen showed slight distension and definite tenderness in the right lower quadrant. Acute appendicitis was diagnosed.

Operation.—This disclosed some bloody serous fluid. The appendix was normal, but was removed. An elongated process of omentum was present, the distal end of which was attached in the region of the hernial sac and about the size of an egg. It was deep purple in colour. The pedicle attaching it to the main portion of the omentum was very thin, about the size of a lead pencil, was three or four inches in length and showed evidences of torsion. This was ligated and the mass removed and repair of the hernia carried out. No note was made of the direction or number of twists. The patient made a good recovery.

CASE 2

Mr. C., aged 54.

History of illness.—He was admitted to the Hamilton General Hospital on October 8, 1932, complaining of abdominal pain of five days' duration. The pain was diffuse and colicky in nature, occurring in attacks lasting two or three hours and felt especially in the upper abdomen. The pain did not keep him awake at night. He was nauseated and vomited, but his bowels had moved every day.

Examination revealed a well nourished man who did not appear extremely ill nor in agonizing pain, but who was obviously suffering distress of moderate degree. The temperature was 102°; pulse, 98; respirations, 20. The urine was negative and the leucocyte count was 12,800.

The patient had a right inguinal hernia which appeared to be perfectly reduced, but he stated that it did not feel quite as usual. No tenderness or swelling could be elicited over the sac or ring. The abdomen was moderately distended and diffuse tenderness was present, being most marked in the right lower quadrant, somewhat medial to McBurney's point. An indefinite tender mass could be made out in the right lower abdomen. A diagnosis of probable appendiceal abscess was made, with a definite reservation as to the presence of some complication connected with the hernia, the nature of which was unknown.

Operation.—The abdomen was opened, some serous fluid escaped, and a large purplish mass, the size of a grape fruit and irregular in shape, was felt, occupying the right iliac fossa. This on first palpation suggested an appendiceal abscess, but the appendix was found lying lateral to the mass and was free and uninvolved, but was removed. Meckel's diverticulum was also ruled out. The incision was extended, and the mass was found to have an attachment in the sac of the right inguinal hernia which consisted of a long narrow process of omentum. This was drawn up, ligated, and divided. The mass could then be lifted up out of the abdomen and was seen to consist entirely of omentum, and to be attached above to the transverse colon by a narrow pedicle, six inches long, and about the thickness of one's thumb, which was the site of several twists. These were untwisted and the pedicle was found to have undergone four and one-half complete turns in a clock-wise direction. The pedicle was ligated, and the mass, consisting of practically the whole omentum, was removed. The patient made an uninterrupted recovery and left the hospital on October 27, 1932.

DISCUSSION

Cases of torsion of the omentum may be classified into two groups: (1) primary or idiopathic torsion, where the omentum is free, accounting for about 13 per cent; (2) secondary torsion where the distal end is adherent in a hernial sac or to some other point in the abdomen; this group constitutes about 87 per cent.

The phases of this subject which appear to be of most interest are the etiological mechanism and the differential diagnosis.

The predisposing causes in the production of torsion of any organ are generally conceded to be (1) a marked degree of mobility of that organ; (2) an elongation of the pedicle; (3) a narrowed attachment of the pedicle; (4) an increase in the bulk of the distal portion, *e.g.*, a

deposit of fat, cyst-development, or œdema; (5) a point of distal fixation.

The frequency of the association of inguinal hernia with torsion of the omentum (87 per cent in the cases reported by Jeffries) suggests the importance of the distal point of fixation as a predisposing cause. We can conceive change of position causing an angulation in the proximal pedicle, with resulting venous stasis and enlargement of the omental mass. Consequent upon this, gravity and strain would naturally induce elongation of the proximal pedicle. The only factor necessary to induce torsion under these circumstances would be some sudden change of position, twist, or strain to initiate the torsion. The exciting cause might conceivably be peristalsis or the sudden emptying of a viscus, such as the bladder or rectum. Once begun, the torsion seems to progress spontaneously. It is also interesting to note that in most of the cases where the direction of the rotation has been recorded it has been clockwise.

The important feature, however, from a practical point of view, is the diagnosis in these cases. It is true that most cases of torsion of the omentum present symptoms which will almost always lead the surgeon to open the abdomen. It is equally true that the diagnosis is nearly always wrong. However, there are certain points which may help to differentiate this condition and lead to at least a tentative diagnosis. In the first place there is the frequent association with a right inguinal hernia. The pain is inclined to be colicky or intermittent at first, recurring at varying intervals. The tenderness is not marked. Rigidity and distension are usually not present in the early stages, and frequently a mass can be palpated.

Operation is of course indicated in these cases and it is important to carry it out before gangrene and secondary infection have occurred. With the above diagnostic points in mind we may be able to reach at least a tentative diagnosis which will prevent undue delay in carrying out surgical treatment. It would also seem apparent that the early treatment of all inguinal herniæ would obviate the occurrence of this condition in about 80 per cent of cases. This constitutes an additional argument for herniotomy as a prophylactic procedure.

In summarizing, the following points would seem to be worthy of note: (1) Torsion of the omentum would seem to be a comparatively rare condition, judging from a review of the literature, but probably occurs more frequently than this would indicate. (2) It is associated in a large majority of cases with inguinal hernia. (3) By carefully considering the clinical picture of this condition, and keeping the condition in mind, it should be possible to make at least a tentative pre-operative diagnosis in most cases.

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CARBON MONOXIDE POISONING.—According to H. M. Barrett carbon monoxide accounts for more human deaths annually than all other gases added together; it is odourless and possesses no irritating warning symptoms. Combined with the hæmoglobin to the extent of 10 or 20 per cent, it causes no appreciable effect except shortness of breath on exertion, with rarely a slight headache. When 30 per cent of the hæmoglobin is attacked there is usually decided headache, irritability, easy fatigability, and some disturbance of judgment. With 40 to 50 per cent of the hæmoglobin in combination with carbon monoxide there is headache, confusion, collapse, and fainting on exertion, while with 60 to 70 per cent unconsciousness is caused, followed by respiratory failure and death if exposure is long continued. When 80 per cent of the hæmoglobin is involved death soon ensues, while a combination of over 80 per cent proves immediately fatal. The methods available for the estimation of carbon monoxide in air and blood may be classified under the following headings: colorimetric (Sayers and Yant, and Haldanel); chemical (the iodine pentoxide reaction); spectroscopic (the most specific of all the methods, and exceeded in delicacy only by the electrical); and gasometric, including the portable appliances of Haldane, Orsat, and van Slyke. In the treatment of carbon monoxide asphyxia the paramount step is to secure the inhalation of a mixture of 5 per cent carbon dioxide in 95 per cent oxygen. Recovery from poisoning with this gas is usually complete if the gassing has not been too prolonged. Tissue changes are more likely to occur from long exposures to low concentrations than short exposures to high concentrations, many of the permanent injuries resulting from CO asphyxia being due to the prolonged anoxæmia of the recovery period. There are many records of recovery from prolonged CO asphyxia in which degenerative changes in the higher nerve centres have occurred, resulting in mental symptoms and, in some cases, paralysis.—*Canad. Pub. Health J.*, Sept., 1934, p. 430; Abs. in *Brit. M. J.*

CALCIUM THERAPY IN TROPICAL DISEASES

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A PREVIOUS investigation of the blood calcium in 1,000 apparently normal persons who were either natives or who had resided in the tropics for a considerable length of time showed a moderate deficiency. This fact led us to investigate the extent of calcium deficiency in tropical diseases, and, if this existed, to learn whether calcium therapy might be of benefit.

MATERIAL

The 225 patients studied presented skin lesions of from six months' to twelve years' duration. In this group there were 50 with tropical ulcers; 70 with mycosis of the skin (actinomycosis, blastomycosis, sporotrichosis); 30 with trichophyton infection; 50 with pinta; 10 with lepromas; 8 with yaws; and 7 with acne vulgaris of three years' duration. A second group comprised 250 patients, of whom 150 gave histories of recurrent attacks of malaria and who showed the hæmatozoa by the concentration method (Rivas), (these patients presented a marked secondary anæmia); 50 with gastrointestinal disorders due to intestinal parasites (hook-worm, amœba, *Schistosoma japonicum*, giardia); 25 with gastrointestinal disorders due to faulty diet, who presented autointoxication, with urticaria; 15 with filariasis; and 10 with mycosis of the lung (blastomycosis, actinomycosis).

TECHNIQUE

In each case the serum calcium was determined by the colorimetric method, and the concentration of ionized calcium by the Rona and Takahashi[1] formula, $Ca{+}{+} = K\frac{H+}{CO_3H_2}$. The average was taken from three determinations on different days. The Table gives the total average of each group of cases expressed in milligrams per 100 c.c. of blood, and shows a moderate deficiency in calcium.

THE EFFECT OF CALCIUM THERAPY

For this investigation we used calcium gluconate (Sandoz), either intravenously or intramuscularly. This preparation was very well tolerated, even in large doses, as much as 30 c.c. daily. Given very slowly, intravenously, and deeply, intramuscularly, we had no reaction of any significance in any of our cases. We found that absorption is better when calcium is given about one hour after breakfast. Most of our patients received 10 c.c. of a 10 per cent solution of calcium gluconate every other day for a period of six weeks to two months.

TABLE I

No. of patients	*Type of disease*	*Ionized calcium concentration, average*	*Serum calcium, average*
50	Tropical ulcer	17.0	7.5
70	Mycosis of skin	18.0	8.0
30	Trichophytosis of scalp ..	17.0	7.8
50	Pinta	17.5	8.0
10	Lepra	17.2	7.6
8	Yaws	18.0	8.0
7	Acne vulgaris	17.5	7.8
150	Malaria	17.2	7.7
50	Intestinal parasites	17.0	8.0
25	Autointoxication	18.0	8.2
15	Filaria	18.0	8.0
10	Mycosis of the lung	17.5	8.0

After the first few injections the patients with tropical ulcers complained of greater irritation, but after two weeks of the treatment the ulcerations started to regress and heal. During six weeks 30 out of the 50 cases with ulcer presented completely healed lesions. The rest of this group were greatly improved and left the hospital refusing further treatment.

The patients with mycosis of the skin and lungs showed marked improvement after three weeks' calcium treatment in addition to the iodides they had been receiving. There was a marked difference in the improvement from a

comparative group who had not received calcium.

The effect of calcium was striking in the patients with autointoxication who also showed urticaria. In some cases the symptoms cleared up after the first few injections, with great improvement in the general condition. No change was noticed in the lesions of pinta, yaws or leprosy, yet the general condition of the patients seemed better. The patients with trichophytosis of the scalp and those with acne vulgaris improved considerably on calcium. The general condition of those with chronic malaria, filaria, and anæmias due to intestinal parasites improved on calcium as an addition to the specific therapy they were receiving.

COMMENT

Calcium deficiency is found, apparently, in most cases of tropical diseases. Such is to be expected, since we find such a deficiency in apparently normal subjects who have resided in the tropics for five or more years. The climate and the mode of life seem to affect the calcium metabolism, and since the channels of calcium intake are few deficiency is the result. Calcium, given in large doses, improves the general condition of the patients and helps the healing process of skin lesions.

We extend our thanks to the Sandoz Chemical Company, who supplied us generously with calcium gluconate.

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CONJUGAL PSYCHOPATHY AND THE PSYCHONEUROSES*

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IN a writing concerning the psychoneuroses Barker describes, among others, neurasthenic syndromes and hypochondriacal syndromes. "The neurasthenic syndrome consists in a combination of diminished powers of mental performance with symptoms of hypersensitiveness and hyperexcitability, persons who . . . had become nervous because of over-exertion or other exogenous cause." "Hypochondriacal syndromes exhibit a chronic invalid reaction . . . become manifest in personalities inadequately adjusted to their surroundings . . the particular pathological pattern met with depending upon the series of external circumstances to which he has been exposed." These conceptions, as etiological factors, are well understood, and, together with others outlined by Barker, account for many of the neurotic symptom-complexes commonly met with. Recently, opportunity was afforded to study a series of these groups of the psychoneuroses, and in recapitulating common factors in the life-situations of the cases at hand conjugal psychopathy immediately presented itself to the attention.

It is not the purpose of this paper to outline new symptom-complexes in a field already a maze of terms and descriptions, but rather to show, if possible, the importance of marital dysharmony in the environment of people who later develop neuroses of the kinds here mentioned. Cases presenting the above clinical syndromes are reported which have as a common factor rather advanced conjugal psychopathy, and its significance as an etiological factor will be apparent.

CASE 1

V.T., a female, aged 20, was admitted after attempted suicide. She was an illegitimate child, adopted at three weeks of age. She was normal until asthma appeared at eleven years and stopped her schooling. At fourteen she was seduced by force, and had an illegitimate child, still-born. At the termination of her pregnancy she learned of her status in the family, when her mother attempted to recover her from the foster parents. She was married at sixteen to a man of twenty years, and in the following four years had four children. Her husband knew of her illegitimate pregnancy before marriage, but after a year began to despise her on this account. He beat her, swore at her, and neglected her. He was unemployed and financial difficulties began. As the home situation got worse, asthma returned, and she was admitted to the general hospital five times in two years with severe attacks. The condition improved immediately she came to hospital, and no attacks occurred while she was there.

After the last admission the husband's attitude was more difficult. He threatened separation, and they even made plans to have the children cared for. Financial troubles were more pressing. She faced losing her children and her husband for whom she had a strong emotional fixation. She became depressed over an un-

* This Essay was awarded the Meyers Memorial Prize in 1934.

desirable future and attempted suicide. The physical findings in hospital were negative. She was not sensitized to any of the common proteins, and, except for a very slight depression, was clear mentally. Psychological examination was negative.

The sequence of events in the case is clear. She was strongly attached to her husband who gradually came to despise her, next to maltreat and abuse her, and then to try to separate from her. She occasionally fought back, but generally put up with her troubles because she could think of no way out. Finally, her threshold was reduced by her life-situation and asthma appeared. When removed from her environs the asthma left her, until a return to home again reduced her threshold. The factors in the environment, it will be seen, were purely psychogenic, and she became over a period "hypersensitive" to them, until her asthma was a habitual reaction. It is important to note that this patient did not complain of her asthma, but stayed with her duties till driven to hospital by it. The home situation was readjusted, the husband and wife were reconciled, and for eight months after discharge (when she was last seen) there had been no recurrence of her asthma.

CASE 2

J.S., a male, aged 41 years, was admitted from a general hospital because no somatic cause could be found for persistent vomiting and complaints of pain in the abdomen. He had a normal active history until appendicectomy without sequelæ at 22 years. He soon joined the army, but was not sent overseas because of his recent operation. After his discharge from the army he had a good occupational record until three years before admission. He married at thirty-three years of age, but his wife refused to leave her family and persuaded him to live there with her. Gradually over a period of years he was forced to change entirely his habits of living, and was dictated to by a dominant, sharp-tongued woman. If he was home late from work, if he took any quantity of alcohol whatever, if he bought some article of which his wife did not approve, he was nagged and scolded for hours afterward. Three years before admission he became nauseated while working, and found relief by irritating his throat till he vomited. This procedure was repeated until he was sent to hospital for a complete roentgen examination. He recovered without treatment, but a year later was in a second hospital with the same complaints. After a third admission and a third x-ray of his gastro-intestinal tract he was transferred for psychiatric examination. A crisis appeared in his affairs before each attack. For instance, the last one was precipitated by inability to pay on his mortgage, and a more than usually protracted quarred with his wife. All physical and laboratory findings were negative, and, except for a mild worry over his job and outlook, he was mentally clear, although somewhat tense and reticent when psychogenic factors in his neurosis were approached.

The personality of the wife in this case, the changes she wrought in the life of the patient, the domination to which he could not adjust, and the resultant conjugal psychopathy, are the series of events leading up to his neurosis. His failure to control domestic affairs required some excuse and he found the pattern for his neurosis in his appendicectomy of years before, and for himself a satisfactory compensation.

Therapy is obviously difficult in such a case because it was impossible to deal with the factor of the wife's personality. Her own lack of insight into the problem also presented an obstacle to his recovery.

CASE 3

A.L., a female, aged 47, was admitted from a general hospital because her physician felt that complaints of anæmia and loss of weight did not wholly represent her condition. The reports were negative, except for a meagre schooling, until she married at 20 years of age. She knew before marriage that her husband drank moderately. After the first child was born his drinking became excessive; he became jealous of her, acted when drunken so violently that she was afraid of him. He once killed a pet bird belonging to his wife, and once struck her so that she was unconscious for a time. The matter then came to the attention of the courts, who provided for a separation, which lasted only a short time. After reunion he attempted to sell his wife's furniture and break up the home. Her hospital record then began, and included seven admissions, in which she was treated for cataract, partial thyroidectomy (twice), encephalitis lethargica, secondary anæmia twice, chronic myocarditis, etc. Her physician finally had her transferred for psychiatric investigation. Physical examination showed mild secondary anæmia and under-weight. There were no positive laboratory findings, and her mental fields clear, with this exception: It was suggested to her that she separate from her husband for obvious reasons, which were explained and she answered, "Oh, no! We are married." Further interviews revealed that she was equally bound in all her conduct by what were to her infallible and unbreakable rules.

It is only fair to point out that in this case the original estrangement may have been occasioned by some difference in moral code between husband and wife, but it is equally apparent that the patient's iron-bound ethics kept her in the turmoil of conjugal psychopathy till she was ousted to hospital by a psychic reaction reflecting in the physical.

Treatment consisted of removing her from the home situation for several weeks twice a year. The case is so recent that no follow-up record is yet established.

GENERAL COMMENT

In the foregoing a definition of the term "conjugal psychopathy" has been purposely evaded until now. Any discussion of it necessitates some context, and is inseparably bound to discussion of its place in the environment of the patient.

To begin with, the word "environment" is used advisedly. The first word of the term, "conjugal", immediately forms a concept of more than one individual and, further, implies that they are married. "Conjugal" hints also that whatever is to follow, it is a matter common to both parties. Thus, although the patient has reached a state of mind showing psychopathology in reactions to the partner of the marital state, the partner is equally abnormal in reactions to the patient, and the patient is forced to deal with psychopathology in the environment. If, for instance, economic stress is given as an etiological factor, it is obviously impossible and absurd to speak about the psychopathology of the patient's financial situation, but a pathological mental state in the marital partner is only too frequently observed.

To complicate matters this psychopathy is conjugal, and, therefore, in reference to the patient himself, and is only an added burden to his own disordered mentality. The result is a reciprocal mechanism, growing step by step into a towering edifice of misinterpretation until the crisis intervenes because one partner can no longer stand the strain.

No comment is to be made here on the origin of such conjugal states, nor upon the intimate sequence leading to their firm establishment, although both these problems are of intriguing interest. Does the condition result from personality differences? what part does sex play? what generalization does the first hint of disharmony fall under? are questions still to be answered.

The importance of the problem to the patient can be seen from the following: it is constantly a factor in his environment; it concerns a person important in his emotional system; it is a disordered state in that person and consists of ideas and conceptions of himself; it is a situation from which frequently he cannot see an escape.

These seem from a preliminary survey to be the factors in conjugal psychopathy, which either independently or in their summation frequently lead to symptom-complexes, known as the psychoneuroses.

UNIOVULAR TWINS; SCHIZOPHRENIA AND TUBERCULOSIS

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THE following report may prove of interest, since it outlines the individual features of schizophrenia more fully than usual, presents important relationships between "identical" or "uniovular" twins, and exhibits various lesions of tuberculosis. It has to do with a female patient, her twin sister, the family history, the patient's illness and post-mortem reports; consequently, the ascertained facts have been arranged chronologically. The twins will be referred to as the "patient" and the "twin".

Case Report

The family history.—The mother was 50 years of age with four brothers and three sisters; no mental disease and no twins in these families. The mother was a hard-working, attractive Scottish woman with a cheerful and wholesome personality.

The father was 56 with two older sisters; no mental disease or twins in these families. Until this year the father's condition had been that of a normal healthy man; of late he had shown mental symptoms consisting of grandiose delusions.

A brother, 29, bookkeeper, is married with one child. There were no obvious mental abnormalities in the history or on examination. A sister, 25, a nursemaid, is now married (mixed race and religion); one illegitimate child. A brother, 22, a plasterer, married; no obvious mental abnormalities in history or on examination. A twin sister, 22, occasionally worked as a domestic and shows definite psychotic symptoms.

The history of the twins.—Born in 1912; weight at birth, patient, 5 pounds; twin, 5¾ pounds. Both had "dysentery" the first and second summers. Both had convulsions and fever at eight months, said to be due to teething. The twin had bronchitis the second year; both had mumps at four years; both had bilateral purulent otitis media following measles at five years of age (1918). The twin had pneumonia complicating the influenza.

The twins as infants were smaller than normal, but developed regularly. They were easily trained and were considered to be exceptionally well-behaved babies and children. The mother noticed, as early as two years, that the patient was more sensitive to scolding than the twin. The former would sob and whimper when reprimanded. However, the greatest difficulty encountered in their upbringing was remembering which was which, and this was done by keeping differently coloured ribbons on them at all times.

The school-age history.—The twins began school at seven years of age, rather than at six years, because they were smaller than other children of their own age. At nine years of age both were seen by the family physician because of repeated attacks of headache, irritability, nausea, and vomiting. These attacks were thought to be due to over-eating. Routine school medical examinations always included a note to their parents that the children were nervous and should avoid excite-

ment. The patient at about ten years of age requested to leave the school room and, when the teacher refused, fainted, but appeared quite well a few moments afterwards. Menstruation began at fourteen years of age in both twins; the periods were irregular, with occasional ammenorrhœa.

The patient, about puberty, began to grow a little taller and thinner in appearance than her more active twin, and from this time on it has been possible to distinguish them, the patient possessing longer hands.

A detailed school report covering eight years was examined. The patient's conduct reports were always excellent. The patient and the twin passed each year with an average record, but the former was not given her matriculation certificate (no reason for this omission could be found out). Five of the teachers were located and interviewed, no leading questions being used. They remembered the twins readily, but the only distinguishing feature, and the one characteristic that each teacher mentioned, was that both the patient and the twin were very quiet well-behaved pupils. One teacher mentioned that the twin appeared to be of a happier disposition than the patient. These facts were considered significant, the teachers having no insight as to the purpose of the inquiry or the present status of the children, and the reports they made included only those impressions which had lasted through the lapse of years.

The mother and other members of the family noticed differences in the personality of the twins which may be summarized as follows: The patient was more sensitive to scolding or criticism. She was jealous and would, for instance, insist on being served first at the table. Nevertheless, the patient was considered to be more affectionate than the twin and the favourite with children and grown-ups. The patient stayed indoors to work or play by herself more often than the twin; she was always neater and more particular in regard to her person and belongings. The twin appeared to be less concerned about things; she just didn't care to the same extent as her sister, "was less sensitive". It was noted that although both children played well together and also with others they both avoided excitement, such as a fight, accident, runaway or fire.

The immediate past history.—The patient and the twin sister have worked since they left school at fifteen years of age. The patient, until she developed a frank psychosis, held positions in wrapping, sorting, and selling departments of retail stores. She then carried on as kitchen helper, housekeeper's assistant and nursemaid. She was never discharged from a position; some employers reported that she did best when working alone. She would leave each position of her own accord after from six to eight months' work with an excellent reference, in order that she might take a rest at home or in the country. The twin has shown less ability, but more stability, in her somewhat similar record. She is now working, although subject to periods of mental disorder.

The patient has been very particular and proper in her social life and never saw fit to encourage the attention of young men, although she was by some considered attractive. The twin has had several casual male acquaintances, but is indifferent to them.

The patient and the twin have been examined with a view to establishing intelligence ratings. Responses to particular tests demonstrates that they score higher than a moron. However, the obvious emotional poverty, with consequent lack of interest, forces the conclusion that intelligence tests are of little value in this type of case.

The history of present conditions.—The patient was certified and sent to the Verdun Protestant Hospital, October, 1930. Ten days prior to admission she had become violent, noisy, obscene and believed she saw a baby in the room. The mother gave a history that the patient's older sister had had an illegitimate child (and added to this married into a very unfortunate situation) eighteen months before the patient was committed to hospital. A few months after the birth of this older sister's baby, the patient became more talkative than usual, telling her troubles to all that would listen, and at times was querulous. She then became quiet, disinterested, and was frequently seen gazing off into space. A few months prior to admission she gave up her position to stay at home. She was at this time impulsive, stubborn, noisy, quite contrary to her usual conduct. She did strange things, such as insisting on washing her clothes at a certain hour on Sunday and substituting her name for the titles and characters in books or newspapers.

On admission to hospital she was acutely ill, the face flushed, throat inflamed, cervical glands enlarged, coughing, with crepitations in both sides of the chest; tachycardia and dehydration were noted. She was resistant to examination, gesturing, pouting, winking, noisy, incoherent or abusive, and profane. Negativism and automatic obedience could be demonstrated at different times.

After nine months' stay in hospital she improved enough to be allowed to go home on trial for 3 months. In the following July (1931) she was re-admitted, being violent and destructive at home. The patient's conversation was disconnected, irrelevant to questions asked; she mumbled a good deal and appeared to be responding to auditory hallucinations.

For the next five months she remained about the same, but by February, 1932, she was very much improved, able to carry on a long conversation in a shy embarrassed manner; well orientated in time and place, amnesia for acute episodes. She still inclined to interfere with others on the ward and at the occupational therapy class. She had no insight, frequently smiled for no apparent reason; no hallucinations could be demonstrated. March 27th.—Patient's improvement maintained, but she still imagined (visual hallucinations) that a baby was within the room, and stated that she cared for the baby (bathing and feeding).

The course of her subsequent illness was as follows. April 12th.—Patient acutely ill; temperature 102°, purulent exudate on the tonsils; throat inflamed; erythema of the skin, with flexor staining (blanching test negative); cervical adenitis, systolic murmur at the apex. She was moved to the acute ward and given antistreptococcus serum and symptomatic treatment. April 13th.—Temperature 103°; irritable, complaining of headache, stiff neck; acute otitis media (right side, purulent); bladder distended; kyphosis at the 12th dorsal, and 1st lumbar vertebræ; Kernig's sign negative; Babinski's plantar flexion present in both sides. April 14th.—Temperature 104°; semi-delirious; the patient curled up on the right side in bed; resisted examination in a confused way. Abdomen distended, not tender. X-ray of the spine showed destruction of the bodies of the 12th dorsal and 1st lumbar vertebræ. April 15th.—The patient was lying in bed on her right side, with the head and eyes turned to the right. The right hand moved voluntarily in keeping with the delirious remarks (for instance, in speaking of writing she went through the movements with the right hand). Ophthalmoscopic examination: edges of the optic discs indistinct; retinal vessels engorged. The physiological cup was present. Paralysis of the left abducens nerve. Left homonymous hemianopsia. Paresis of the left facial nerve. The palmo-mental reflex was active and equal on both sides; tendon reflexes were increased on the left side; exhaustible clonus of the left ankle; abdominal reflexes absent but the patient's abdomen was distended. Babinski's sign present on both sides; Kernig's positive on the right side, negative on the left. The extremities of the left side were hypotonic (flaccid), lacking in muscular tone, although the tendon reflex is hyperactive. Gordon's and Oppenheim's signs were positive on both sides. The patient was sensitive to pin-prick over the whole of the skin surface, and painful stimuli caused a withdrawal reaction of the limbs on the left side. She could not move the left limbs volitionally; she could and did execute movements with the limbs of the right side when requested. Later in the day there were

definite athetoid movements affecting the left hand. Lumbar puncture was done. The patient was quieter after the puncture. X-ray of the right mastoid was normal.

April 18th—The patient's condition had become progressively worse. The hemianopsia was absent today; the pupils showed hippus, and the left fundus oculi exhibited frank papillœdema. Death 2 days later.

Laboratory report.—October, 1930, blood Wasserman test was negative. The laboratory examination showed urine to be negative. The leucocytes were moderately increased. The cerebrospinal fluid was clear and showed an increased cell content.

Post-mortem report.—The brain was removed without difficulty. The surface was hyperæmic; the arachnoid was thickened and matted about the base of the midbrain and pons. No actual pus or tubercle could be seen. There was a small hard area, about one centimetre in diameter, on the surface of the cortex at the tip of the right temporal lobe, and at this point the cortex was adherent to the dura.

Both lungs showed small caseous tubercles in the apices. On opening the abdomen the omentum was found adherent over the pelvis, and, on freeing this, the underlying intestines and pelvic organs were found to be deeply injected. The right tube, ovary and appendix were buried in adhesions on the right wall of the pelvis. The uterus was very small. The left tube was long and the ampulla was dilated, resembling a large hydrosalpinx. Between the ampulla and the uterus the tube was twisted three times. The right tube was freed from the adhesions, and was then found to be thickened and to contain caseous material. The deformity of the twelfth thoracic and first lumbar vertebræ could be felt, but no abscess was demonstrated.

Microscopic report. — (Laboratory of Neuropathology, Royal Victoria Hospital.) "Blocks of brain and meninges from the base of the brain stem were sectioned and stained with hæmatoxylin and Van Gieson and the Ziehl-Nielsen preparations. The meninges show marked thickening, engorgement of vessels and infiltration with cells, predominantly lymphocytes. Frequent plasma cells, endothelial phagocytes and occasional polymorphonuclear leukocytes are also found. Similar cells are seen packed in the perivascular spaces for considerable distances into the brain substance, and there is sub-intimal accumulation of endothelial cells in many small vessels. Several giant cells are seen and small areas of beginning coagulative necrosis. The Ziehl-Nielsen stained sections reveal numerous acid-fast bacilli throughout the infiltrated meninges. The microscopic picture described is characteristic of tuberculous meningitis of rather short duration and fulminating intensity. The demonstration of acid-fast bacilli seems to be conclusive verification of the etiology. Diagnosis: Tuberculous meningitis."

Finally, to consider the present status of the twin. Clinical and x-ray examinations extending over a period of nine months have shown no evidence of tuberculosis in the lungs, spine or genito-urinary tract. The external genitalia and uterus are hypoplastic, as in the patient. Mentally, she is emotionally shallow and inadequate; for instance, her sister's death evoked no obvious concern in the twin. On two occasions she has become "shut-in" and unresponsive to such a degree that commitment papers have been made out by the family physician to have her admitted to a mental hospital.

It should here be recorded that a number of photographs of the twins, taken almost every year from birth till eighteen years of age, were examined. There can be little doubt that these twins are of the true "uniovular" or "identical" type.

Case Reports

A CASE OF SEPTICÆMIA RESULTING FROM A CAT BITE

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Jasper, Alta.

H.F., aged 31, a Canadian, single, was admitted to hospital on October 17, 1934.

History of present illness.—On October 11th the patient was playing with a cat, and was bitten by the animal in the pulp of the terminal phalanx of the right thumb. Two days later he noticed that the thumb was slightly tender, so swabbed it with iodine. The pain increased, and on October 14th he noticed that the thumb was slightly swollen, and that there appeared to be some "matter" at the site of the bite, which had healed over in the interval. He opened the wound with a razor blade and obtained about one or two drops of a clear fluid, slightly blood tinged. The next day the swelling was more pronounced and his arm was stiff and sore. The axilla was also very tender and he felt quite miserable, having a severe right lateral headache. That night he was unable to sleep with the pain, which had become throbbing in character. The next day the stiffness and soreness had extended up into the neck muscles of the right side and the right side of the face. He was in an isolated area and could not get a train out until the early morning of October 17th, when he reported for treatment.

Past and family history.—Negative.

Physical examination.—Temperature 102.8°; pulse 90; respiration 22. The patient was well nourished, well developed and looked very ill. His skin was hot and dry. He had a slight right-sided ptosis, which was due to an old injury. The glands along the anterior border of the right sterno-mastoid muscle were palpable and tender, the muscle itself being

quite tense, as were the other muscles of the right side of the neck. The axillary glands, particularly the anterior group, were easily palpable and very tender. The epitrochlear gland was markedly enlarged, standing out on the arm, the size of a hazel nut, and exquisitely tender to the touch. The right forearm was swollen and showed numerous petechiæ, especially on the inner surface. The right thumb was not markedly swollen, but showed a small dry wound in the pulp of the terminal phalanx. The area surrounding this wound showed no fluctuation, but was exquisitely tender. The rest of the hand, with the exception of the area between the thumb and the index finger, which was slightly swollen and tender, was healthy looking. At this time, there were no red lines up the arm. The heart showed no enlargement and no murmurs, and, although the rate was increased, the rhythm was regular and the force good. The lungs showed coarse moist râles over the bronchial areas, but otherwise appeared normal. The abdomen was negative. The spleen was enlarged, but not palpable. The rest of the examination was negative.

Laboratory data.—Urine: concentrated, dark orange colour; acid; specific gravity 1.030; albumin plus; sugar 0; a few granular casts. Blood: hæmoglobin 90 per cent; white blood cells 20,000; differential count; polymorphonuclears 82 per cent; lymphocytes 15 per cent; eosinophiles 1 per cent and monocytes 2 per cent. Pus: a few staphylococci, but a preponderance of short and long streptococcic chains.

Treatment.—The patient was given saline hand baths three times daily, for an hour at a time, and between times flaxseed poultices were applied to the thumb and surrounding area. Fluids were forced and a light nutritious diet given. Saline laxatives were used freely at first. Codeine, gr. 1, was used to control the pain. Tepid sponge baths were used to control the temperature and whiskey was given occasionally after a rigor. On October 24th, slight fluctuation was present in the area between the original wound and the anatomical snuff box and in the palm of the hand between the thumb and the index finger. Three incisions were made in these areas, and a small amount (about two or three drops) of bloody serous fluid was obtained. This was examined under the microscope, but could not be plated, due to lack of the necessary equipment. On October 28th a small amount of thick creamy pus was present at the site of the original wound, but this had disappeared by October 31st.

Subsequent history.—A day or so after admission petechiæ were noticed on the right upper arm and the chest. These gradually disappeared about the 25th or 26th of October. Red lines also became visible on the forearm about October 19th, but had disappeared by the next day. Following the incisions made on October 24th, the patient made very favourable progress, and was discharged from hospital on November 5th. At that time there was no drainage from the wounds. They had healed over normally, and only the epitrochlear gland was palpable, and this was not tender. The patient had lost from 25 to 30 lbs. during his illness, and of course was weak when discharged, but felt very well otherwise. The temperature from the time of admission was characteristically "church steeple" reaching at times 105°, but began to fall on the 12th day of the illness, reaching normal, to stay, on the 22nd day.

Comment.—This case is not uncommon, but is of interest for several reasons, namely, (1) the rather unusual cause; (2) the almost classical character of the signs and symptoms; (3) the initial severity, and (4) the very rapid and complete recovery. It is regrettable that blood cultures could not be made, nor the pus obtained, plated, but even without these conclusive tests the diagnosis was never in doubt.

The preparation known as the Aromatic Chalk Powder, which is still included in the B.P., has a curious origin. When Sir Walter Raleigh was imprisoned in the Tower of London for twelve years, he was permitted to have a room fitted up as a laboratory where he might carry on his experiments in chemistry. Here, it is said, he invented a confection which became known as Raleigh's "Sovereign Cordial" or the "Royal Cordial", the virtues of which were praised by Queen Anne of Denmark and Prince Henry of England. Lefèvre, the chemist and apothecary of Charles II, is said to have prepared some of this confection for administration to his royal master during his last illness. The original formula consisted of forty roots, seeds, and herbs, macerated in spirits of wine and then distilled. The product was then to be mixed with bezoar stone, pearls, coral, deer's horn, amber, musk, antimony, and combined with various earths, sugar, and other substances. Under the name of "Raleigh's Confection" it found a place in the London Pharmacopœia of 1721, and the formula underwent various modifications until the middle of the nineteenth century, when it survived in the form of Aromatic Chalk Powder.—C. J. S. Thompson in "The Mystery and Art of the Apothecary", 1929, p. 245.

Editorial

THE PLACE OF ACETYLCHOLINE IN THE ANIMAL ECONOMY

CHOLIN was first isolated by Strecker as long ago as 1849 from the bile of pigs, and some thirteen years later he established its chemical constitution. Since cholin is a constituent of lecithin it would seem probable that in some form or other it is to be found in all living cells. The acetic ester of choline — acetylcholine — was first prepared by Baeyer in 1867, but its physiological importance was hardly guessed until 1906, when Hunt and Taveau,[1] at the Toronto meeting of the British Medical Association, drew attention to its intense activity. The history of acetylcholine and the masterly experiments which led to the recognition of its remarkable place in nerve, muscle and glandular metabolism reads like a romance. And the end is not yet.

T. R. Elliott,[2] working in Cambridge, was the first, in 1904, with prophetic insight, to suggest that autonomic nerves transmitted their effects by releasing at their endings some specific chemical substance which reproduced their action. He suggested that the resemblance between the effects of the sympathetic nerves and those of adrenaline might be explained on the assumption that sympathetic impulses on arriving at the nerve endings might release adrenaline or something similar in immediate relation to the effector cells, which would then give the same responses as to adrenaline artificially applied. This conception was taken up and amplified by the late W. E. Dixon,[3] who argued that the parasympathetic nerves must similarly release a chemical transmitter of their effects. This substance, he thought, might be muscarine. However, it proved later to be choline or an extremely unstable ester of choline. Dixon's paper in which he described his remarkable heart-vagus experiment—was read at the same meeting in Toronto at which Hunt and Taveau reported their work on acetylcholine, but no one at the time suspected that there was any connecting link between these two quite independent communications. Sir Henry Dale,[4] in 1914, made a thorough investigation of the actions of acetylcholine, but it was not until 1929 that Dale and Dudley[5] discovered the substance in an animal organ in sufficient quantity to permit of its isolation and identification. Dale (*loc. cit.*) suggested, on the basis of his studies, that acetylcholine would be admirably fitted to play the part of a parasympathetic hormone, though the proof of this did not come until much later. The evidence on which this conception is based has been well marshalled by Cannon.[6]

The demonstration that acetylcholine could take part in a normal reaction in the animal body was first conclusively demonstrated by Otto Loewi[7] and his associates, working from 1920 onwards. They proved that the effects of nerve impulses in the vagus in inhibiting the heart-beat of the frog are transmitted by a chemical substance, later shown to be acetylcholine, which escapes during the period of such inhibition into the Ringer's solution filling the heart in such amounts as to permit the inhibition being carried over to another heart by transfer of the solution. Acetylcholine is a substance easily hydrolysed and so is rendered practically inert by the action of an enterase contained in the heart muscle. Physostigmine inhibited the destructive action of this substance on the vagus hormone. It was found later that atropine did not prevent the liberation of the hormone, but prevented its acting, just as it interferes with all choline esters.

1. HUNT, R. AND TAVEAU, R. DE M.: On the physiological action of certain cholin derivatives and a new method for detecting cholin, *Brit. M. J.*, 1906, **2:** 1788.
2. ELLIOTT, T. R.: On the action of adrenalin, *J. Physiol.*, 1904, **31:** 20P.
3. DIXON, W. E.: Vagus inhibition, *Brit. M. J.*, 1906, **2:** 1807.
4. DALE, H. H.: The action of certain esters and ethers of choline and their relation to muscarine, *J. Pharm. & Exp. Ther.*, 1914, **6:** 147.
5. DALE, H. H. AND DUDLEY, H. W.: The presence of histamine and acetyl-choline in the spleen of the ox and horse, *J. Physiol.*, 1929, **68:** 97.
6. CANNON, W. B.: Chemical mediators of autonomic nerve impulses, *Science*, 1933, **78:** 43.
7. LOEWI, O. *et al.*: *Pflüger's Arch.*, 1921, **189:** 239 and in succeeding volumes.

These fundamental observations have led to similar investigations on other organs besides the heart. Thus Englehart[8] has studied the action of the third cranial nerve on the mammalian iris. This worker detected acetylcholine or some similar substance in the iris and ciliary body of rabbits and cats, which is increased considerably on electrical oculo-motor stimulation. Babkin *et al.*[9] have shown that when one chorda tympani going to a submaxillary gland is stimulated something passes into the blood, which, if physostigmine be present to prevent its destruction, causes not only a fall in arterial pressure but a secretion from the fellow gland. This "something" Gibbs and Szelöczey[10] proved to behave in all physiological respects like acetylcholine. This work has been confirmed and extended by subsequent workers. Also, facts elicited some years ago by Rona and Neukirch and by Le Heux[11] seem to indicate that the intestine has some power, probably through an enzyme, to synthesize choline and acids to form esters, and that the stimulating action of some salts depends upon the increased activity of the corresponding esters; and Abderhalden and Paffrath,[12] and Loewi and Navratil[13] have demonstrated the existence in the intestine of an enzyme that destroys acetylcholine. Therefore, acetylcholine may play some part in regulating the activity of the intestine. Other evidence could be adduced to show that the stimulation to activity of certain secretory glands, such as the sweat glands, salivary glands, and adrenals, and of voluntary and involuntary muscle is dependent on the liberation of acetylcholine. As Dale explains it, parasympathetic nerve impulses reproduce the peripheral effects of acetylcholine because, when they arrive at the nerve endings, they liberate that substance in relation to the effector cells. The action of the chemical substance is on the effector cells and not on the nerve endings. The detailed mechanism of the action of acetylcholine has not as yet been fully worked out, but so far it is clear that this substance is an important factor in the normal functioning of many organs. This implies that current notions as to pharmacology and its terminology will have to be revised. A general systemic action of acetylcholine in connection with normal physiological processes has so far not been recognized. According to Dale, there is no physiological evidence of any actions of acetylcholine in the body other than those produced by its local peripheral liberation. Perhaps this is accounted for by the fact that, ordinarily, acetylcholine, though powerful, has an extremely evanescent action, for it seems to be no sooner produced than destroyed. However, things may be different when acetylcholine is designedly introduced into the animal body in relatively large amounts, to produce some particular effect, say upon a secretory gland, a muscular organ, or upon the vasomotor system.

Villaret and Besancon[14] were the first, in 1926, to study the action of acetylcholine in man. They found that the subcutaneous injection of 0.05 to 0.1 g. produced no subjective symptoms, and only dilatation of the artery of the retina was noted. With 0.2 to 0.4 g. they obtained slight excitation of the parasympathetic system, sometimes bradycardia, a fall of 10 to 20 mm. of Hg. in the blood pressure, and a general feeling of warmth. Ellis and Weiss[15] found that acetylcholine was rapidly inactivated and had a relatively slight vasodilatory effect on the general arteriolar system of normal subjects, though they think that it may play a part in intermediary metabolism other than its effect of the neuromuscular mechanism.

8. ENGLEHART, E.: The humoral mechanism of oculomotor stimulation, *Klin. Wchnschr.*, 1931, **10:** 26 and 215; *ibid., Pflüger's Arch.*, 1931, **227:** 220.

9. BABKIN, B. P., ALLEY, A. AND STAVRAKY, G. W.: Humoral transmission of chorda tympani effect, *Trans. Roy. Soc. Can.*, 1932, **26:** Sec. 5, 89.

10. GIBBS, O. S. AND SZELÖCZEY, J.: The humoral transmission of chorda tympani stimulation, *Arch. Exp. Path. & Pharm.*, 1932, **168:** 64.

11. LE HEUX, J. W.: Cholin as a hormone of intestinal movement, *Pflüger's Arch.*, 1921, **190:** 280.

12. ABDERHALDEN, E. AND PAFFRATH, H.: Cholin content of muscularis and mucosa of intestine, *Arch. f. ges. Physiol.*, 1925, **210:** 620; *ibid., Fermentforsch.*, 1925, **8:** 299.

13. LOEWI, O. AND NAVRATIL, E.: On the humoral transmission of cardiac nerve activity, *Pflüger's Arch.*, 1926, **214:** 678, 689.

14. VILLARET, M. AND JUSTIN-BESANCON, L.: Raynaud's syndrome: action of histamine and acetylcholine, *Bull. et Mêm. Soc. Méd. d. Hôp. de Paris*, 1926, **50:** 472.

15. ELLIS, L. B. AND WEISS, S.: Study of the cardiovascular responses in man to intravenous and intra-arterial injection of acetylcholine, *J. Pharm. & Exp. Therap.*, 1932, **44:** 235.

Attempts have been made to utilize acetylcholine in the treatment of various abnormal states, chiefly is so far as it may modify the circulation and incite muscular activity. Kennedy and Barker[16] and Goldman and Osserman[17] have tried it in disturbances of the peripheral circulation, and Markovits[18] in arteriosclerosis. The effects seem to be uncertain, though pain often was relieved. Better success seems to have been obtained in the case of post-operative ileus, as described by Klée and Grossmann (1923), Wolf and Canney,[19] Abel,[20] and Sainton[21]. Acetylcholine has also been used in rheumatism by ionization. Encouraging results seem to have been obtained in rheumatoid arthritis, osteoarthritis, bursitis, sciatica, and neuritis. It is too soon, however, to evaluate the treatment in these cases. Taking advantage of the fact that acetylcholine can produce rhythmical contractions of the uterus, Wong and Chang[22] have used it to induce labour. No doubt, in time sufficient facts will have accumulated to show what value acetylcholine may have in therapeutics. A.G.N.

16. KENNEDY, F. S. AND BARKER, N. W.: Vasodilating effects of acetylcholine on peripheral arteries, *Proc. Staff. Meet. Mayo Clin.*, 1932, **7**: 94.
17. GOLDMAN, A. AND OSSERMAN, K.: Use of acetylcholine in the treatment of peripheral vessel occlusion, with report of three cases, *Med. Rec.*, 1934, **139**: 579.
18. MARKOVITS, F.: Acetylcholine in arteriosclerosis, *Wien, klin. Wchnschr.*, 1933, **46**: 1294.
19. WOLF, C. G. L. AND CANNEY, J. R. C.: The treatment of ileus by choline, *The Lancet*, 1926, **1**: 707.
20. ABEL, A. L.: Acetylcholine in paralytic ileus, *The Lancet*, 1933, **2**: 1247.
21. SAINTON, J.: Treatment of paralytic ileus by choline and acetylcholine, *Presse Méd.*, 1934, **42**: 386.
22. WONG, A. AND CHANG, H.: The oxytocic action of acetylcholine, experimental and applied for the induction of labour and in other obstetrical conditions, *Chinese Med. J.*, 1933, **47**: 987.

THE HOSPITAL SITUATION IN CANADA DURING 1934

DESPITE far more than their share of difficulties and discouragements our hospitals have come through the year 1934 with flying, if often tattered, colours. Though facing the continuation of a most discouraging financial situation, only one or two very small hospitals have actually closed their doors. There has been a decrease in earnings, largely because of the drop in private ward patronage. Some hospitals with crowded public wards have actually closed up portions of their private accommodation, space which could not cope with the demand back in 1928-29. In a survey by our Department some months ago it was found that hospitals with training schools had an average occupancy for the preceding year of but 58.4 per cent, while those without training schools (largely smaller hospitals) averaged but 50.8 per cent. Few indeed of our hospitals have endowments, and such as there are are yielding greatly diminished dividends. Many of the hospitals in rural areas, particularly in certain parts of the middle west, have had great difficulty in collecting from debtor municipalities, principally because the latter were themselves insolvent. Feared reductions in provincial grants in several provinces have not materialized, and it is a pleasure to note that in British Columbia the former grants have been restored. In the latter province the hospitals are cooperating with the government in the framing of the anticipated health insurance legislation. The launching of group-hospitalization plans by the Edmonton Hospitals Advisory Council and by the two hospitals at Kingston is of particular interest.

Very little new construction has been observed in 1934. In Montreal the new wing of the Western Division of the Montreal General Hospital and the Neurological Unit of the Royal Victoria Hospital (see November issue, p. 555) have been opened and the Jewish and St. Mary's Hospitals are also ready. A new fifteen-story structure is being erected by the Toronto Western Hospital; the new Women's College Hospital is fast taking shape; and the Mount Sinai Hospital in Toronto will be opened next month. Fort William and Port Arthur are getting a new tuberculosis sanatorium. An excellent small hospital has been erected in the Bulkley Valley District, British Columbia. The mental hospital at Falconwood, Prince Edward Island, has been rebuilt. Many hospitals needing enlargement or replace-

ment are awaiting a more propitious time for expansion.

The hospital association conventions in all provinces have been unusually good and well attended. Constructive programs and timely round-table discussions have been of great value to the members and to the hospitals represented. It is of interest to record that when the Nova Scotia and Prince Edward Island Association met in Charlottetown, the Premier of the Island, despite many other duties, was so interested that he attended and participated in every day and evening session of the convention, while on the Pacific coast the Minister of Health gave a dinner to which the Association Executive, the Cabinet, and others were invited to discuss hospital legislation.

The medical staffs have been taking a greater interest in the welfare of their hospitals. Many staffs have been reorganized during the past year; services have been formed, and staff meetings improved in quality; autopsy percentages have definitely risen on the average and some hospitals have shown remarkable improvement. Five more hospitals have been added to the list approved for internship by the Canadian Medical Association. This year Dr. F. C. Bell, of Vancouver, on behalf of the standardization program of the American College of Surgeons made an intensive survey of those hospitals large enough to qualify for the minimum standard of that body, and the stimulus of his visits on the local profession has already had widespread effect. No reference to hospital workers would be adequate without comment on the great *esprit de corps* which is everywhere evident among the nurses, the doctors, the trustees and the lay staff. Although responsibilities have been increased and, for employed personnel, incomes usually much reduced, the spirit of loyalty developed everywhere is a shining evidence of the oft-times obscure silver lining.

It would seem that hospitals have gone about as far as they can in effecting major economies. Further large scale economies would seem possible only under some plan of greater coordination and control, whereby overlapping and reduplication of effort in some centres could be minimized—a radical change which, in view of its possible effect on philanthropy, etc., might not be an unmixed blessing. Costs are now lower than for many years back. The effect of the depression has been to stimulate the hospitals to develop their semi-private and semi-public accommodation. Flat rates have been developed and extras absorbed into routine charges, where finances will permit. However, it is doubtful if hospital costs can remain at their present comparatively low level. For instance, commodity costs are rising definitely and there are other influences of even more permanent import. Economies have been so drastic in the last few years that much needed repairs and replacements have been put off year by year. This cannot go on indefinitely if efficiency is to be maintained. The purchase of new equipment has been put off, and, with the constantly increasing complexity of our diagnostic and therapeutic armamentarium, it is essential that hospital equipment be kept up to date. Hospital salaries have been reduced to an indefensible minimum in too many hospitals. Nurses and others work far longer hours than has been permitted for years in most organized vocations.

As these factors are corrected it is obvious that the costs to the paying patient cannot do else but go up—unless the cost of indigent care be more fully borne by the municipalities, the provinces, and by philanthropy. These three sources of supplementary revenue are already heavily burdened, but we must face the fact that we cannot maintain this magnificent network of efficient life-saving institutions across the country unless the public, collectively or otherwise, is willing to give greater support, particularly as the support required would still be but a fraction of what these hospitals save annually to the citizens of their respective communities.

HARVEY AGNEW.

Editorial Comments

The Control of Specialism

We would draw the attention of our readers to the Association Notes in this issue, under which appears a proposal for the control of specialists in Canada. It will be evident from the report of the special committee that this matter requires a great deal of careful study, and that their proposals are made with much caution.

They first would refer the qualification and certification of specialists to the Medical Council of Canada. But it is pointed out that this will at once throw certain responsibilities on the whole fabric of the organized profession; on provincial councils who would receive and consider the applications of the practitioners to take specialist examinations; on medical faculties in Canadian universities, who would provide the educational requirements laid down by the provincial councils; on medical associations, who should endorse the principles of specialist control and urge the importance of a minimum educational standard for those who would practise a specialty; and on the existing specialists and their associations, who should support attempts to maintain high standards of efficiency among their members, demanding, for example, that they should be registered, and trying to have Boards of Directors of Hospitals restrict their future appointments to those so registered.

The principle underlying the whole movement is the protection of the public from unqualified specialists, and the committee makes a strong point of the fact that if this principle is accepted then all the arguments justifying the protection of the public from the unqualified practitioner by our present licensing system can be used to justify attempts to control specialists.

There are other points to be discussed, such as the length and type of training for specialism, and the matter of fees. Many hold that one of the fundamentals of a specialist's training should be a prolonged period of general practice. This might keep the number of specialists down, but to that we see little objection. Specialism is here to stay; it must receive careful regulation. The whole report is to be discussed at the next annual meeting, and we would urge careful digestion of its proposals in the meanwhile. H.E.M.

Theobald Smith

Dr. Theobald Smith, one of the most original of investigators and a scientist of world-wide reputation died on December 10, 1934, in New York. Doctor Smith was born at Albany, N.Y., in 1859, and graduated at Cornell and the Albany Medical College in 1883. He then became director of the pathological laboratory of the Bureau of Animal Industry under the Department of Agriculture and Professor of Bacteriology in Columbia University. In 1893, with Kilborne, he made the epoch-making discovery that red water in cattle was transmitted by ticks and demonstrated the passage of the infection through the ova of one generation of ticks to the next. For the first time it was shown that a protozoan parasite could be disseminated by the bite of a blood-sucking arthropod. His next outstanding work was the differentiation of the bovine and human types of the tubercle bacillus, which he did while Professor of Comparative Pathology at Harvard. In 1904 he gave the first description of anaphylactic shock in guinea pigs—the syndrome still known as the "Theobald Smith phenomenon". In 1907 he immunized guinea pigs against diphtheria by a mixture of toxin and antitoxin, and, two years later, suggested that the method might be applicable in the case of human beings, anticipating in this by several years the procedure advocated by von Behring and Park. From 1915 to 1929 Doctor Smith was director of the Department of Animal Pathology at the Rockefeller Institute of Medical Research, of which institution he became Director Emeritus on his retirement. In 1915 he called attention to the part played by milk in the causation of streptococcal sore throat. In 1922 he made the basic discovery that the natural bacterial antibodies were excreted in the colostrum of cows and that it was due to this quality of the colostrum that the calves became resistant to bacterial infection. Doctor Smith's work was thus of most far-reaching importance and it is gratifying to know that he obtained full recognition before he died. A.G.N.

J. Clarence Webster, C.M.G., M.D., D.Sc., LL.D., F.R.C.P., F.R.S.C., F.A.C.S.

Our congratulations are cordially offered to Doctor Clarence Webster on the honour which he received at the New Year from His Majesty the King, by which he is admitted to the Order of St. Michael and St. George. Doctor Webster was formerly Professor of Gynæcology at McGill University and Gynæcologist to the Royal Victoria Hospital, succeeding the late Professor William Gardner. He left Montreal to take the position of Professor of Gynæcology at the University of Chicago, where he consolidated his professional fame and built up an international reputation. After retiring from medical work Doctor Webster returned to

his birthplace, Shediac, N.B., where he took up the study of the early history of Canada, in which he had long been interested. He amassed a unique and valuable collection of Canadiana and became a recognized authority on Wolfe and his times. Doctor Webster was also particularly active in preserving memorials of Wolfe both in his native county of Kent and in this country. He has rendered good service as a member of the Historic Sites and Monuments Board of the Dominion. Doctor Webster has written much, and is the author of an excellent text-book on gynæcology as well as of many articles of medical interest. His place as a gynæcologist, archivist, and historian seems secure. A.G.N.

Errata

In the *Journal* of December, 1934, page 603, a paper entitled "The Relationship of the Sedimentation Rate in Rheumatic Infection in Childhood to Alteration in the Albumin Globulin Ratio" was presented by R. R. Struthers and H. L. Bacal. The authors wish to make the following corrections in the method described:—

1. (B). Calc.: 0.7 x c.c. N/50 used = per cent protein as albumin.
2. Final Calc.: B = Albumin
   A–B = Globulin
   C–A = Fibrinogen

$$\text{Albumin} \div \text{Globulin ratio} = \frac{\text{Alb.}}{\text{Glob.}} = \frac{\text{B}}{\text{A–B}}.$$

We regret that, though with no fault on our part, an error of calculation has appeared in Dr. Otto Lowy's article entitled "A comparative study of the habitual use of barbiturates and coal-tar derivatives as furnished by reports from various hospitals throughout the United States", which appeared in the December *Journal*, on page 638. In the last column of Table V (p. 641) the figures given are based on two and a half million instead of twenty-five million. In other words the figures are ten times too large. The same error appears in the fifth conclusion. A careful reading of the article will, of course, easily reveal the mistake and should not lead to misunderstanding.

A.G.N.

Retrospect

MODERN VIEWS ON PROSTATIC OBSTRUCTION*

BY A. I. WILLINSKY, F.R.C.S.(C.),

Toronto

Democritus,[1] the founder of the atomic theory of philosophy concisely expressed the underlying spirit of the medical sciences when he said "Nothing is permanent but change." The Laughing Philosopher's epigram holds as good today as it did two thousand years ago. In no field of human endeavour is the truth of this better exemplified than by the sequence of changes in the treatment of prostatic obstruction. In less than one hundred years there has been a complete cycle in the development of the surgical treatment of this important lesion. This cycle may be arbitrarily divided into three periods. In the first, transurethral operation was advocated as the best procedure; in the second, prostatectomy, suprapubic or perineal; in the third, which is the present one, we are discarding open surgery and are again recommending the endoscopic route.

As long as prostatectomy was the only dependable means for the relief of obstruction due to the prostate gland early diagnosis was not of great importance, in view of the formidable character of the operation. Postponement of intervention until absolutely necessary had been the rule of surgery. This operation had been considered only as a last resort, being looked upon as a major operative procedure associated with a high mortality and relatively lengthy morbidity. Treatment in the past, therefore, has had to contend with the effects of neglected prostatism, such as a dilated upper urinary tract, and a thick-walled scarred, inelastic bladder, with accompanying urinary sepsis. Today, however, the situation is entirely different, because early treatment has become relatively less dangerous. As a consequence early diagnosis is now essential in order to prevent the disastrous sequelæ of untreated prostatism. It is necessary for the profession to realize the ubiquity of this ever present entity so that they can combat it in its curable stages and thereby prolong life.

It is neither feasible nor necessary for the clinician to attempt to differentiate the exact type of lesion of the gland that underlies the obstruction, because the resultant changes both in the upper and lower urinary tracts differ only in degree. This difference depends not on the complex conditions which can occur about the region of the prostatic urethra but upon the actual degree of urinary obstruction produced. Emphasis must be placed not on the change in the prostate itself but upon the disturbance in the hydromechanics of the bladder brought about by the obstructing gland. I do not wish to underestimate the importance of a definite differential diagnosis of the pathological variations

* From the Department of Urology, Toronto Western Hospital.

of the prostate gland. Rather, I am stressing the fact that it is not possible for the general practising physician to make this diagnosis, because he lacks the necessary mechanical equipment that is essential in the establishment of an exact histopathological picture. Yet it is to the family doctor that the average patient first presents himself. Therefore, it is incumbent on the physician, with his meagre facilities, to increase his diagnostic acumen by a very careful analysis of the varied symptomatology of the early cases of prostatic obstruction. The results of tardy diagnosis in the treatment of intestinal obstruction are well known. The profession demands that an early diagnosis should be made if we are to improve the mortality rate in this condition. Finney[2] has confirmed this, when he said "It is more important to operate early than to operate well and if he himself had an acute obstruction of the bowels he would rather have the occasional operator operate on him at once, than the best surgeon in the world after a few days." It is not essential that the general practitioner should make an accurate pre-operative diagnosis of the type of lesion underlying the obstruction, as that may only be possible on the operating table. It is expected however, that a diagnosis of intestinal obstruction should be made with sufficient promptitude so that surgical interference will not be too late. We are today in an analogous position in regard to the prostatic problem.

In this paper, I shall endeavour to outline briefly the physiological basis for some of the symptoms met with in this condition, to thus stimulate interest in the patient's reactions to this disease and at the same time to aid their better understanding. It is imperative that the clinician should have a working knowledge of the neuroanatomy and the physiological principles underlying the sequence of events in prostatism if he wishes to understand the symptom-complexes of this condition.

In considering the early symptoms of the prostatic obstruction, we must realize that as a rule they represent some deviation from the normal act of micturition. The micturition reflex has been made the subject of intensive study, but complete unanimity of opinion is still lacking. This variance of opinion is explained by the difficulty of correlating accurately the physiology of urination in animals with that of man, since in the former it is not as completely under control of the will as it is in the latter. However, the animal experimental work of Dennig,[3] Barrington,[4] Graves and Davidoff,[5] the cystometric studies of Rose[6] on the human, and the neurosurgical procedures of Learmonth,[7] have done much to elucidate the function of the bladder in health and in disease.

The urinary bladder in man is essentially a muscular organ whose functions are storage and periodic discharge of the renal secretion. Its musculature consists of three layers of smooth muscle fibres, which are intimately interwoven, so that the entire musculature constitutes a functional unit, the detrusor urinæ muscle. The outlet of the bladder is provided with an internal sphincter composed of non-striated muscle and an external sphincter of striated muscle. The nervous control of the urinary bladder is mostly reflex in character, depending upon a very intricate nervous mechanism. Three sets of nerves reach the bladder and its sphincter. Two of these sets belong to the autonomic system and the third to the somatic system. The double nerve supply from the autonomic system is made up of sympathetic and parasympathetic fibres, the former coming from the thoracico-lumbar outflow culminating in the hypogastric nerves, the latter from the sacral outflow forming the pelvic nerves. The somatic representative, which has to do with the voluntary sphincteric control, is found in the pudic nerves.

Recent physiological work has shown that section of the pudic nerves results only in imperfect closure of the external sphincter and some loss of urethral sensitivity, but does not materially disturb the normal function of the bladder. Section of the hypogastric nerves, either alone or in addition to the pudic nerve, results in no marked change in bladder function in normal persons. Section of the pelvic nerves, however, brings about profound functional and trophic disturbances of the bladder. On the other hand it has been shown that stimulation of the pelvic nerves elicits relaxation of the sphincter mechanism and contraction of the detrusor muscle, resulting in the expulsion of the contents of the bladder; stimulation of the hypogastric nerves brings about increased tonus of the internal sphincter and relaxation of the detrusor muscle. In general, the sympathetic and parasympathetic innervation of the bladder may therefore be regarded as mutually antagonistic. The sympathetic nerves, taken as a whole, are the filling nerves of the bladder, while the parasympathetic group are the emptying nerves of the bladder.

There are still many questions in the physiology of the filling bladder and the micturition reflex which remain in dispute. A brief survey, however, of the generally accepted theories and established facts may be summed up as follows. The bladder is a viscus in which the phenomenon of tone plays an important rôle. It does not fill passively like a toneless sac. This postural activity is so adapted that it maintains in the bladder cavity up to its optimum capacity the

same intravesical tension with varying volumes of urine. In other words, the bladder wall adapts itself to its contents, keeping the intravesical pressure constantly at a level of about 150 m.m. of water. The bladder exhibits a distinct muscular activity during its filling. This is shown by rhythmic wave-like contractions during the filling process. Starting with the apparently empty bladder at the normal pressure of 150 m.m. (water) the urine enters from the ureters and slowly accumulates. The response of the vesical musculature to the slow accumulation of urine has been described concisely by Graves and Davidoff.[5] "In the period of rhythmic activity the muscle fibres are lengthened as the filling proceeds. The intermittent contractions represent a sort of clonic response to the stimulus of stretching or distention. Later, further distention is further resisted and the state of tonic sustained contraction is reached. It is in this state that pressure within the bladder rapidly rises. In other words, the bladder at first apparently responds to the gradual filling, isotonicly, that is, by increasing the length of the muscle fibres without materially changing the tension. Finally, when a sufficient quantity has accumulated, the response becomes isometric; the fibres maintain the same length and respond to the stretching force by a rapidly increasing tension."

We can now understand why there is no increase in the pressure gradient during the rhythmic contraction period as the urine collects, because the muscle fibres of the bladder actively elongate and thus increase the bladder capacity. This adaptation of the bladder to its increasing contents is carried on reflexly through its sympathetic control which causes the bladder wall to relax and at the same time reinforces the closure of the sphincter. However, when about 250 c.c. of urine have been secreted the intravesical pressure rises suddenly, since the muscle fibres of the detrusor resist further elongation. When the pressure has reached about 180 m.m. afferent impulses are set up which travel by the parasympathetic outflow to the higher centres. In these centres these impulses are translated into a desire to micturate. If it is inconvenient to urinate, impulses from the cerebral cortex act through the sympathetic fibres and further relax the bladder and tighten the sphincter. As the capacity of the organ is in this manner increased, the internal pressure falls again to the normal 150 m.m. level; as a result the efferent impulses through the parasympathetic nerves cease and the desire to urinate temporarily passes off. This is a remarkable example of a conditioned reflex due to the demands of our modern civilization. In those individuals who have marked hyperactivity of the sympathetic nerves the bladder may become accustomed to accommodate very large quantities of urine before its fibres fail to relax and allow a rise of intravesical pressure to take place.

The actual mechanism of the evacuation of the bladder is carried on by impulses from the cortex which stimulate the parasympathetic nerves, which in turn contract the bladder wall and relax the sphincter. Certain accessory muscles are frequently involved in emptying the bladder. The abdominal wall contracts, the diaphragm descends, and the breath is held with the glottis closed. The rise of the intra-abdominal pressure which results compresses the bladder from without, then the intravesical pressure rises to about 300 m.m. of water and the bladder is evacuated. Of course, micturition can be voluntarily carried out before urgent afferent impulses have been received. This is especially marked in the individual who has parasympathetic predominance in the nervous control of his bladder. In this type the power of the bladder to elongate its fibres is held in abeyance, and as a result the capacity, although normal for that individual, is much below the opposite type with sympathetic preponderance. It follows, then, from these general considerations that the type of functional activity in the normal human bladder depends in a large measure upon the balance of the antagonistic actions of the sympathetic and parasympathetic division of the autonomic nervous system. Appreciation of this observation has led Graves to designate the bladder with hyper-reactive parasympathetic control as active, and the bladder with sympathetic over-activity as passive. Graves,[8] in his studies of bladder regurgitation has shown that only the active bladder in the presence of vesical neck obstruction permits reflux up the ureters, whilst the passive bladder never does. This important clinical observation demonstrates that the exaggerated sympathetic tonus of the passive bladder tolerates extreme dilatation of the bladder itself, without the danger of reflux up the ureters. This confirms the experimental evidences that stimulation of the vesical sympathetic fibres produces relaxation of the detrusor and at the same time contraction of the sphincter-like mechanism of the ureterovesical orifices as well as the internal sphincter. On the other hand, in the active bladder with its enhanced parasympathetic control, the inhibited uretero-vesical valves offer very little resistance to regurgitation up the ureters, particularly in the presence of obstruction at the natural outlet.

Obstruction to the outflow of urine, especially by an anatomical obstacle such as a deformed or enlarged prostate, has a definite tendency to disturb the functional balance of the controlling innervation of the bladder. With similar degrees of obstruction the symptomatic response will depend to a great extent upon the viscerogenic reflexes to the autonomic controlling factors of the mechanism of urination.

The group of patients who have a preponderance of parasympathetic control will present in many ways an entirely different clinical picture from those with sympathetic predominance. In those patients who in health evince no evidence of imbalance of the dual autonomic factors of

micturition, the obstructing prostate produces only a temporary upset of bladder function. Owing to the stability of the bladder reflexes in this group, the tendency is towards rapid re-establishment of normal urinary function as soon as the acute obstructive lesion has been mitigated.

Clinically, three groups have been recognized for many years, but the rôle of the autonomic nervous system in the production of these has not been appreciated until lately. As far back as 1910, Kidd[9] differentiated three distinct clinical types. He classified them, moreover, according to their onset symptoms as follows: (1) the "Irritable Bladder" type; (2) the "Painful Retention" type; (3) the Painless Incontinence" type. This symptomatic classification is both practical and important, since it places emphasis on the early symptom-complexes of each group.

In the light of our present knowledge of the neurophysiology of bladder hydro-mechanics we are able to understand the reason for these totally different reactions to a similar etiological factor. The clinico-pathological course of the "Irritable Bladder" group can be accounted for by parasympathetic predominance. The "Painless Incontinence" type represents the group with sympathetic hyperreactivity. The "Painful Retention" group is a sequence of the effect of acute obstruction in a bladder in which the innervation is perfectly balanced.

Let us first consider the "Irritable Bladder" type, since this group comprises the majority of those who suffer with prostatism. As its name indicates, the onset symptoms are referable to irritability of the bladder, which is first shown by frequency of micturition. This frequency can be explained on the basis of the modern conception of the physiology of urination. It has been stated that intravesical tension and the desire to void follow parallel oscillations. As a result of mechanical obstruction at the outlet there is a tendency for overstretching of the bladder wall, which in turn acts as a growth stimulus, resulting in hypertrophy of its fibres. This hypertrophy gradually increases so as to enable the expulsive force of the bladder to overcome the obstruction; it increases bladder tone, so that the micturition pressure of 180 m.m. will be reached before the normal amount of urine has accumulated. Since pressure, not quantity, produces the desire to void, the amount of urine to set up afferent impulses becomes correspondingly smaller, and, hence, frequency gradually increases. In this group the parasympathetico-tonia inhibits relaxation of the bladder, and in this way tends to aggravate the frequency, so that dysuric symptoms eventually develop. Ultimately, when the expulsive power of the bladder begins to fail, decompensation occurs, resulting in incomplete evacuation of the bladder, with the consequent development of residual urine. At this time the patient notices a prolongation of the act of urination, diminution in the voiding distance, owing to impairment of force, and a gradual decrement in the calibre of the stream due to actual narrowing of the posterior urethra. The residual urine tends to produce excessive stretching of the bladder wall, in consequence of which its nutrition suffers, lowering the tissue resistance to infection. Infection is readily precipitated by the presence of the stagnant residual urine, so finally cystitis and pyelonephritis develop. The inflammation of the bladder mucosa converts the frequency into an urgency which generally terminates in complete painful retention.

The development of pylonephritis in these active bladders is due to the ease with which urinary reflux occurs. The inhibitory effect of the parasympathetic nerves on the ureterovesical orifices combined with the vesical neck obstruction, forces the infected urine up the ureters practically at every effort to void. Early relief of obstruction is most essential in the prevention of this disastrous complication.

The sequence of events in the "Painless Incontinence" type is entirely different. In this group of passive bladders the preponderance of sympathetic nerve control produces a vicious circle. The dilatable atonic bladder, with its spastic sphincter, places these patients at a decided disadvantage. It requires very little anatomical obstruction to produce high grades of urinary obstruction with its grave results. It is in this group that obstructive lesions of the prostate are so insidious in onset and progress so silently before the appearance of true symptoms referable to the lower urinary tract. Here we have the patient who is entirely unaware of his inability to empty his bladder completely, and who has no sense of discomfort, in spite of a chronically distended palpable bladder easily recognized by percussion and palpation. Although disorders of urination are present, they are in the background as far as the subjective symptoms of the patient are concerned. In fact some of these patients maintain that they have no difficulty in voiding, only complaining that they have some dribbling at times. The urinary act in this sympatheticotonic group becomes a mere overflow, because the rhythmic contractions of the bladder which has become accustomed to accommodate very large quantities of urine are not of sufficient intensity to set up proper afferent stimuli. The escape of urine, then, is chiefly due to overflow from an overfilled organ. In this passive bladder there is no urinary reflux, but there is marked upper urinary stasis as a result of the coincident ureteral and pelvic dilatation. This dilatation of the upper tract represents the general lack of tone produced by the overacting sympathetics aggravated by the stasis in the lower tract. The dilatation of the pelves of the kidneys gradually leads to destruction of the parenchyma of the kidney with nitrogen retention in the blood. The principal symptoms, then, in this sympatheticotonic group are refer-

able to the gastro-intestinal, cardio-vascular, and nervous systems. They vary in accordance with the degree of renal insufficiency, and tend to hasten the normal degenerative changes of these aging individuals. Sudden decompression of the bladder in this group as a rule leads to death from uræmia.

The "Painful Retention" type is described by Kidd[9] as follows. "A man of 50 or 60, in the best of health, discovers that he is unable to pass his water. After a few hours he is taken with painful cramps in the hypogastric region, and an intense desire to pass water, but he can effect nothing, and becoming alarmed he sends for the doctor. A dose of morphine and a hot bath are all that is required, although resort must be had to the catheter if this treatment fails, and the difficulty disappears for the time being, perhaps for 6 months or a year. These attacks are repeated at lessening intervals until the retention may be complete and permanent, so that regular catheterization becomes an established necessity. They appear to be produced by a condition of congestion of the prostatic urethra and spasm of the sphincter apparatus, set up by irritation, cold, or alcohol or by a mild bacterial invasion of the prostatic urethra. They are painful because the bladder muscle is in good condition and able to undergo cramping contractions."

It is interesting to note here that Randall[10] states that this group is always associated with bilateral lobe hypertrophy. The author would like to add that a properly balanced autonomic nerve control is the second essential. From the preceding remarks one can say that the clinical response to an obstructive lesion at the neck of the bladder depends in a great measure on the balance of the autonomic factors of bladder control. The passive bladder with its silent prostate and uræmic picture falls under the caption of localized sympatheticotonia whilst the active bladder with its irritable prostate and complicating pyelonephritis fits in with localized parasympatheticotonia.

Clinical experience has shown that many men who have definite hypertrophy of the prostate gland, as demonstrated by rectal palpation, have no symptoms or signs of urinary obstruction and, conversely, many others who have no enlargement of the prostate gland, that can be verified by rectal examination have various degrees of urinary blockage. We can say, therefore, that it is the amount of obstruction at the neck of the bladder to the urinary egress that causes symptoms, rather than the size of the gland.

Whilst it is true that prostatic palpation cannot be depended upon solely in the diagnosis of prostatic obstruction, it is essential that a rectal examination should be a routine step in the physical examination of all males, especially when past fifty. It must be remembered that 75 per cent of prostatic cancers can be readily detected by the examining finger. The typical nodulation, the definite fixation, and the peculiar induration, once felt, can never be forgotten. Unfortunately, early diagnosis of prostatic malignancy is of very little value to the helpless individual, because once a diagnosis of prostatic cancer has been definitely established the outlook is a foregone conclusion.

Although the tubular character and the small diameter of the urethra is well known, we do not properly appreciate the fact that a relatively small amount of prostatic tissue actually causes the blockage. Furthermore, the entire gland could not take part in the production of the obstruction, owing to its peculiar anatomical configuration.

The present transurethral methods of correcting pathological conditions of the prostatic urethra differ, however, very much from those employed in the early period of endoscopic surgery. It was not until the evolvement of the collateral sciences which gave us accurate optical and sensitive electrical equipment that we have been able to make the present progress in the management of the obstructing prostate. Refinement in the construction of endoscopic instruments, and application of new electro-physical principles, together with the increased knowledge of the bio-chemistry and the physiology of the urinary system, have combined to make possible the present advance in the electric resection of the prostate.

The ideal of all surgery is the preservation of anatomical parts in their normal relationship. This is actually obtained by the transurethral method. It certainly seems unjustifiable to perform the major operation of either suprapubic or perineal prostatectomy when it is only necessary to remove a relatively small amount of tissue from a fairly accessible situation. The simple removal of the obstructing tissue, rather than the entire gland, is based upon sound principles. Thus, Randall,[10] in his painstaking statistical study of the pathological anatomy of prostatic obstructions has pointed out that the majority (94 per cent in his series) of the lesions of the prostate gland are benign. There is no denying the fact that prostatic resection is less severe and less confining than the classical operation of prostatectomy. The profession are now in a position to recommend it to patients for whom in the past they have been inclined to advise delay. Further, this procedure has a tendency to commend itself to elderly men owing to their antipathy towards major procedures at their time of life.

In closing, let me remind you that it is exactly one hundred years since Guthrie,[11] the pioneer of transurethral surgery, in a lecture in London, advocated the treatment of prostatic bars at the neck of the bladder by incision with a knife blade projected from a catheter. By a process of slow evolution from this basic idea, the Stern-McCarthy Visual Prostatome has developed, with its exquisite control, accurate vision and tremendous possibilities.

SUMMARY

Early diagnosis of prostatism is a life-saving procedure.

Differentiation of the obstructing agent is not clinically important.

Prostatic obstructive symptomatology is determined by viscerogenic reflexes.

The three clinical groups are related to autonomic balance.

Rectal examination of the prostate *per se* is not dependable.

The presence of residual urine indicates bladder decompensation, not prostatic obstruction.

The importance of prostatic carcinoma as an obstructing agent has been overemphasized.

Reconstruction of the urethral channel is physiological, especially in early prostatism.

Electric resection presents a definite advance in the solution of the prostatic problem.

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Medical Economics

Medical Services for Those Unable to Pay

The following circular letter, issued by Dr. E. S. Moorhead, Chairman of the Committee of Sociology of the Manitoba Medical Association, is reprinted herewith for information and is accompanied by a statement from him as to the success of the plan now in operation in Winnipeg for providing medical services for those unable to pay fees.

Dear Doctor:

With the cooperation of the following hospitals: Children's Grace, Misericordia, Mount Carmel Clinic, St. Boniface, St. Joseph's and Winnipeg General, a two months' trial is being made of a new method of admission to out-patient departments. During this period admission will be through the medium of a letter from a private practitioner. The regulation will not apply to cases at present in continuous attendance at an out-patient department, but only to new cases and to former patients who return after an absence or with a new ailment.

This letter is being sent to you, as the cooperation of both the honorary staffs and private practitioners is needed for two reasons, (1) to prevent abuse of the privilege of attending the out-patient department, and (2) to see that no patient is deprived of necessary treatment through too rigid application of a rule.

A private practitioner, when recommending a patient to the out-patient department, should do so in writing, stating whether the reference is for the purpose of diagnosis only or for treatment.

Undoubtedly, patients about whom you know little or nothing will apply to you for such a letter. In such a case, a short examination should satisfy you as to his or her needs, and it would be quite in order for you to state that you know little about the circumstances, but believe that the patient is unable to pay even a modest fee.

You are now being given an opportunity to assist in controlling the large numbers who attended out-patient departments in the past. Whether rightly or wrongly, the profession considered that many of these people had no claim to the free services of the honorary staffs. Taxpayers also felt that they were being imposed upon. This experiment may require a little trouble on your part for which you will not get paid, but it is an attempt to refer patients who are able to pay a moderate fee to a family practitioner.

The hospitals are requested to attach the practitioner's letter to the history sheet for the staff specialist's information. Should there be no letter, the member of the honorary staff will be within his rights in asking for an explanation and, if satisfied by the patient and the hospital authorities that it was not possible to obtain such a letter, then diagnosis and treatment should be carried out in the ordinary way. The medical relief plan has shown that there are many people who have no family doctor, and it would not be reasonable to make a rule so rigid that no one could enter the out-patient department unless he had been attended by a private practitioner.

From the viewpoint of the honorary staffs, this plan is intended to result in patients with trivial complaints and able to pay a modest fee consulting a family practitioner. When a patient brings a letter, there is the reasonable assumption that there is something of interest in his case, and that his circumstances justify him in applying for free service.

While asking for the cooperation which I have received so whole-heartedly in the past, I would impress two things upon you. Try to see that the plan is carried through with as little embarrassment as possible to the hospitals. See that no action of yours gives the press or the public grounds for criticism of our profession.

Yours truly,

E. S. MOORHEAD,
Chairman, Committee on Sociology.

August 14, 1934.

The plan for providing medical services to people on relief has been carried on in Winnipeg and the suburban municipalities since its inception in February last with a gratifying absence of friction. Judged by the scarcity of complaints from patients, the service is evidently of the best. Practitioners recognize that the fees are not remunerative, but balance that with the feeling that they are giving a fair share of help in the present economic difficulties. Municipal representatives have expressed their appreciation of the service

supplied and the very moderate scale of fees. In the case of the city of Winnipeg, with a large number of citizens on relief, the Civic Council felt that the total monthly cost was greater than its finances would stand. The situation was aggravated by the refusal of Dominion or Province to give any assistance. In view of this, the profession voluntarily reduced the maximum operating fee from $50.00 to $25.00, and the hospital visit from 75 to 50c. All other charges remain as before.

A "relief" pharmacopœia, with a very moderate scale of charges, has now been issued. If a doctor will prescribe from this, or from the British Pharmacopœia or Canadian Formulary, his patient can get the prescription filled at any drug store without further authority from the central relief office. The druggist will thus retain his clientèle, and the patient will be saved long journeys.

With the cooperation and active assistance of the hospitals of Greater Winnipeg, an interesting experiment is being carried out. Patients are now being admitted to out-patient departments through the medium of a private practitioner's letter. For the reader who is interested in this method, a report in the *British Medical Journal*, dated June 23, 1934, pp. 1123 and 1124, should be studied. At a meeting of 500 representatives of the great voluntary hospitals in England, sentiment appeared to be against a continuation of the policy of "The ever-open door", "Free service to all", etc.

Winnipeg hospitals have not been asked to refuse assistance to all patients without a letter. People living in some rural districts might find it impossible to get a letter, and the same applies to emergencies and accidents. The profession in Greater Winnipeg has always been careful to avoid criticism from the press or public. A single case refused admission at the door of a hospital, through the actions of the honorary staff, might easily arouse a storm of criticism and alienate the sympathies of the public.

The practitioner's letter must be attached to the history sheet, and, if absent, the staff specialist is quite within his rights in questioning the bona fides of the patient. If satisfied with the explanation, service is of course provided. A short form is being prepared to take the place of the letter. Two important results are taking place; the out-patient department is being used as a consulting clinic, and members of honorary staffs do not now feel that they are being imposed upon by citizens able to pay a modest fee.

E. S. MOORHEAD

Health Insurance in British Columbia

That some form of health insurance legislation will be placed upon the statute books during the next session of the Provincial Legislature appears certain. A special committee appointed by the Council of Physicians and Surgeons has been keeping the members of the profession informed of the steps being taken in their interests, and endeavouring to secure the united cooperation of all the members when dealing with the Government in any measure which may be introduced. In addition to this the Health Insurance Committee has for the past year been collecting information on health insurance and its operation in other countries.

Certain principles which are considered to be of cardinal importance are that any plan considered satisfactory by the Committee must include measures which will protect the interests of the patients, ensuring their having proper medical and surgical care, and must also safeguard the interests of the profession. Further, that, although the pending legislation is being initiated in this province, and it will, if it proves satisfactory, be followed by similar measures in other provinces, there are many very obvious advantages in a national plan. For this reason any plan adopted in this province must have the most careful consideration beforehand. To this end the Health Insurance Committee have had conferences with the Provincial Secretary and Dr. Cassidy, the Director of Social Services, and have been promised that in the course of drafting the Bill they shall be kept informed of all provisions relating to medical matters, and given the fullest opportunity of consulting and cooperating with the sponsors of the Bill where medical questions are dealt with.

For the more efficient performance of these functions the Council has decided to enlarge the Committee to include wide provincial representation. Funds have also been voted to provide for a paid secretary to the Committee during the next few months, whose principal duty would be to act as its representative in all matters pertaining to Health Insurance, to act in an advisory capacity in drafting legislation, and to safeguard medical interests.

Every registered practitioner in British Columbia has been fully informed by letter of the progress and activity of the Committee, and, in order to meet any emergency that may arise, has been asked to sign a proxy giving the Council of the College of Physicians and Surgeons the assurance that it is speaking with the full support and understanding of the profession.

D. E. H. CLEVELAND

Men and Books

SATIRA MEDICA

A CASUAL ANTHOLOGY OF THE SATIRE WHICH HAS BEEN DIRECTED AGAINST PHYSICIANS IN ALL AGES.*

BY E. P. SCARLETT, M.B., F.R.C.P.(C.),

Calgary

Petronius Arbiter, cynical courtier to the Emperor Nero, remarked on one occasion that a physician is only a satisfaction to the mind.

Inventum est medicina meum, said Apollo, and what was Apollo but the devil?—*Burton.*

The physician realizes that the illogical attitude of human beings is nowhere displayed more effectively than in medical matters, and this has coloured his philosophy of life. Satire and ridicule, indeed, he has had in good measure. "In every country," says Opie Read, "the family doctor is a natural sprout from the soil. His profession is almost as old as the day-break of time. He bled the ancient Egyptian, blistered the knight of the Middle Ages and poisoned the arrow of the Iroquois. He has been preserved in fiction, pickled in the drama, spiced in romance, and peppered in satire." The arrows of the satirists may at times have been a corrective of medical folly, but at least the physician understood and expected such weapons of verbal warfare. He is less happy, however, when confronted by a new method of battle, when, instead of satire or tirades against the treatment of disease, a new legion comes forth against him, bearing the banners of social and economic reform and using less sophisticated weapons than satire. Instead of being ridiculed for his pomposity or his exclusive attitude the physician is now accused of belonging to an archaic order. Criticism is no longer couched in well-mannered satire and polite formalities, but has become the strident cry of frothy and superficial devotees of democracy, clamouring for change. Medicine, for centuries the target of the shafts of satire, is now called upon to face the thunderbolts of political materialism. A new era in the criticism of the doctor has dawned.

The increasing lay education in medicine, in addition to making the public hysterical in matters of health, has reacted to destroy the physician as even a modest oracle. The public is suspicious of the doctor in his time-honoured role as the family adviser, but still believes in him to some extent as a scientist. The physician is thus caught in a dilemma. The public makes demands of him as a scientist which, because medicine is still largely an art, he cannot fulfill. The layman then becomes bitter and satirical. He finds that the physician is unable to treat him as the lay canons of science dictate; he thereupon becomes impatient with the physician's approach to him medically. And thus arises the modern problem of the physician and his patient. This is in truth the modern "Doctor's Dilemma". No difficulty of this sort existed in the past, and we must therefore appreciate this difference between the modern satirical spirit and that which preceded it.

Leaving the social and economic problems of medicine in the troubled present with the host of its fellow spectres, it is our purpose to explore the byways of medical satire, with due regard, I trust, for the proprieties of both humour and medicine. In the course of our journeying we shall meet very little great satire, for this presupposes an intimate knowledge of medicine, which few of its lay critics have possessed. It is impossible to fully satirize a man without knowing all his merits and his defects. That is probably why so little of the satire directed against medicine has really gone home to the mark at which it was aimed.

MEDICAL SATIRE IN GENERAL

The medical profession, which for the most part has taken itself seriously, has always been fair game for the satirist. As Kipling remarks, "Doctors always have been and always will be exposed to the contempt of the gifted amateur, the gentleman who knows by 'intuition' everything it has taken them years to learn". The public in every age demands its victims, and at times the physicians have been the Christians cheerfully thrown to the lions on the general principle that their religion is wrong.

Much of the satire against medicine has been the product of those denied the placidity of serene good health. Molière, the greatest of all the satirists of things medical, bore an eternal grudge against physicians because of their inability to cure his tuberculosis and because he thought his son had been killed by an overdose of antimony. Other satirists have been in reality sophisticates dabbling in faith cures. Of all critics the most "robustious" is George Bernard Shaw, whose gestures of derision are less those of the play-boy than of the fanatical vegetarian and anti-vivisectionist. Still others have written in spleen. "Knock or the Triumph of Medicine," a modern drama in which physicians are bitterly satirized, was written by Louis Farigoule because the medical profession would not accept his views on extraretinal vision. However, in all justice it must be said that most of the satire, whether raging in the old-fashioned manner, with Juvenal, or in the modern style with Butler, has been fair

*Portions of this paper were read at the Sixty-fifth Annual Meeting of the Canadian Medical Association at Calgary, June 21st, 1934, in the Section of Historical Medicine. It is considerably abbreviated here, also.

combat, in which occasionally the Goliath of medical pedantry has been smitten with the pebble of common sense. For the truth is that many physicians have been dull dogs. The narrow outlook which the medical guild frequently breeds, the differences of opinion, the clumsy medical etiquette, particularly in matters of consultation, the natural conservation of an ancient order have afforded abundant opportunity to the satirist, who has gleefully ridden into the lists and tilted against such follies. The sins of the physicians have been many and grievous, but it is some consolation to find in reviewing medical satire that it is seldom the honest plodding physician who has been the object of attack. Most of the invective and raillery has been directed against the white-livered ranks of the quacks who in every age have fed fat upon the labours and benefits of established rational medicine.

Of course the fact that medical knowledge is in a constant state of flux has invited the scorn of the literally-minded and of those who rejoice in dogmatic truth finally and completely revealed. On this account, from certain aspects, much of our history as a profession appears disastrous and even ludicrous. For example, the Prince of Orange was trephined seventeen times, whereas today he would have been given "aspirin"! In this extremity the physician must bear the attack of the satirist with good humour, for after all such play is mere tilting at the illusions of history.

When one reviews the characteristics of the medical man which have been pilloried one finds that the same faults and follies have been attacked in every age. The satirical thrusts are almost stereotyped, at times so nearly approach a formalism that they lack vitality. The most constant strain has to do with the elements of quackery, whether in the profession itself or among its motley camp-followers. The urine-gazing of the mediæval period, the augural cane, and the clyster of later times, the dishonest therapeutic assumptions of all ages have been attacked as the symbols of trickery. A pompous manner, an affected speech which puts language on stilts (calling a humble mustard plaster a sinapism), the fee-grasping propensity, simulating prosperity as a means of attracting patronage and large fees, an impersonal attitude, have been qualities ascribed to the physicians. Their guild isolation has brought ridicule, for, like the Pharisees, they have set themselves apart with broad phylacteries upon their brows. Other evils berated are that the doctor kills rather than cures (a constant cry), that druggery defeats nature, that the physician pours medicine of which he knows little into bodies of which he knows less, that consultations kill by numbers, that there is no check upon medical mistakes. For invective, bitter irony, and at times high, rough fun, the physician has been a shining target.

The extracts which follow give some indication of the course of medical satire through the centuries.

ANCIENT AND BIBLICAL

"Medicine is one of the nine low trades."—(Chinese Folk proverb). "Physicians live by patients, officials by unlucky princes, princes by litigants, and clever men by fools."—(Indian proverb). "The best of doctors will go to hell."—(Talmud, Kiduschin, 82a). "Do not live in a city governed by a physician."—(Talmud, Pesachim, 113a). "He who sins against his Creator must come into the hands of the physicians." This last injunction, undoubtedly having a double meaning, is from the Book of Jesus Sirach (180 B.C.), which also contains the passage paying tribute to the physician beginning—"Honour a physician according to thy need of him with the honours due unto him: for verily the Lord hath created him."

There are three interesting passages in the Bible.

"And Asa, in the thirty and ninth year of his reign, was diseased in his feet; his disease was exceedingly great; yet in his disease he sought not to the Lord, but to the physicians. And Asa slept with his fathers."—(II Chronicles, chapter 16, verses 12, 13). "Physician, heal thyself."—(St. Luke, chapter 4, verse 23).—The eternal injunction!

"And a certain woman which had an issue of blood twelve years, and had suffered many things of many physicians, and had spent all that she had, and was nothing bettered, but rather grew worse."—(St. Mark, chapter 5, verses 25, 26).

CLASSICAL

Much of our knowledge of Greek medicine and of its offshoot, the medicine of the Roman Empire, is found in the secular writers. The Greeks, with their love of speculation, clear, direct and good-natured, treated medical faults lightly; the Roman writers, animated by a powerful social sense, and regarding the profession of medicine for the most part with contempt, castigated the physicians with as bitter satire as has ever been written. They had ample cause for their complaints, it is true, as it is doubtful whether medicine has ever had so much prosperous quackery wearing its badge of office. As Pliny says, the physician of the time was distrusted as a possible poisoner or a framer of fraudulent wills. Aristophanes poked fun at the temples of Æsculapius. In the *Clouds* he refers to the physicians as lazy, long-haired foppish individuals, with rings on their fingers and carefully polished nails. Plutarch neatly takes down for all time the physician who talks too much.

> "Physicians who, forgetting their profession, depart from their thickets and invade the forests of poets and fields of orators, more busied in showing off than healing; they bawl about the bed of the patient a hotch-potch of the ideas of Cicero and the aphorisms of Hippocrates. The malady grows worse, but that goes for nothing, provided they succeed in making it be said, 'Here's a man who talks well'."

Again he says of certain individuals that they are "like the surgeons who swagger in public and

who do their operations in a theatre to attract more money".

Æsop, who lived in Samos in the sixth century, B.C., was no friend to the physicians. One of his fables is entitled, "The Incompetent Physician".

"Once upon a time there was a doctor who did not know his business. He went to visit a patient who had been told by other physicians that he was in no danger although he might never get entirely well. This doctor, however, told him to set his worldly affairs in order, 'For', he said, 'you won't live for more than a day longer'. With these words he departed. A short time afterwards, the patient got up and went out for a walk, dragging himself along with difficulty and looking rather pale. The doctor met him, looked at him and said, 'Good morning. How are the gods in the Land of the Dead getting on?' The patient answered, 'They have settled down. They are drinking the waters of Lethe. But a little while ago, the two gods Death and Hades were terribly excited. They were threatening to do all sorts of terrible things to the doctors on earth because the doctors knew so much that they kept men from dying. And so these gods started to write the names of all the doctors. They had actually written down your name on the list. But I went up to them and told them that they were mistaken. 'This man,' said I, 'pointing to your name on the list, has been falsely accused. He is not a physician at all'."

Have the perils of prognosis ever been more neatly satirized?

Pliny the Elder, born in 230 A.D., is one of the greatest satirists of the medical profession who have ever lived. In the twenty-ninth book of his "Natural History" he takes the guard off his rapier.

"People who do not understand Greek place no confidence in a physician unless he practises his art in the Grecian style; indeed, they have less confidence when they understand what serves to cure them. It is striking that there is no art so incomprehensible or liable to change its methods more often than medicine, as there is none other so lucrative.

"Whosoever professeth himself a physician is straightwaies believed, say what he will: and yet, to speak a truth, there are no lies dearer sold or more dangerous than those which proceed out of a physician's mouth. Howbeit, we never once regard or look to that, so blind are we in our deep persuasion of them, and feed ourselves, each one in a sweet hope and plausible conceit of our health by them. Moreover, this mischief there is besides, that there is no law or statute to punish the ignorance of blind physicians, though a man lost his life by them . . . They learn their skill by endangering our lives."

THE MEDIÆVAL PERIOD

The mediæval period, roughly, may be regarded as extending from the final disintegration of the Roman Empire to the discovery of printing, about 1450. It was a time of chaos and tumult, but the classical tradition remained firm and the *religio grammatici*, holding philosophy the queen of sciences, embraced medicine, albeit a sterile and formal medicine. It was an age of violent contrasts, expressing childish simplicity and the most downright brutality in act and language. The basis of all mediæval life was religious, with authority and superstition contending with an exulting paganism.

The mediæval satires and jests about the physicians have much to do with quackery, for, during that period, Europe swarmed with impostors and wandering drug peddlers. The "physicien" however was held in some awe, on account of the element of superstition in the mediæval mind.

John of Salisbury, the grave and sardonic scholar (born 1120), writes:

"What shall I say about the practising physicians? God forbid that I should say anything bad about them, since, for my sins, I fall too often into their hands. They should rather be soothed by politeness than angered by words, and I do not wish that they should treat me hardly." And again: "When I hear them talk, I fancy that they can raise the dead, and are in no way inferior to either Æsculapius or Mercury."

Petrarch (1304-1373), who hated the physicians, ridiculed them for their subservience to the Arabs, their predilection for urine-gazing, and their country-fair deceptions. He wrote a letter to Pope Clement VI, advising him "to avoid the mob of medical men". He explains the traditional sallow complexion of the physician in true Rabelaisian fashion:

"I who am no physician and who know no logic will yet show you the real cause of your pallor so truly that you will be forced to accept my interpretation, whether you like it or not. You spend your life in places that are dark, livid, stinking, pale. You thrust your faces into human water-works, you stare at the urine of invalids, and your mind is set on the yellow of gold coinage. What wonder then if you who are constantly living among things pale, black or yellow, should yourself become pale, dark and yellow also? It is from the stools that patients stick under your nose that you get both your colour and your smell."

This is brutal invective indeed, with its animosity rather over-reaching itself.

There is a universal note in the ironical humour of de Mondeville.

"If a physician is called to a patient and finds that he has a surgical disease, he will say, 'Sir, it is well known that surgeons are proud and pompous, although entirely devoid of logic and often ignorant, or, if they know anything, they have learned it from us physicians. Besides, they are cruel men and also they demand high fees. On the other hand, you are weak, suffering, and you have already heavy expenses, so I advise you not to seek their counsel. And I, because of my regard for you, although I am not a surgeon myself, will try to help you without them'. If such a patient recovers—well. If he does not, then the physician will say, 'Sir, I told you from the first that I am not a surgeon. But, because I pitied you, I did what I could do well, and according to art and logic, and better than any surgeon, God knows. However, I am just now occupied with certain other important cases which will prevent me from attending you as frequently as before. So I advise you to let me call in a surgeon.' "

From the Regimen Sanitatis of Salerno—

"Let doctors call in clothing fine arrayed,
With sparkling jewels on their hands displayed,
And if their means allow, let there be had
To ride, a showy rich-attired pad.
For when well dressed and looking over-nice,
You may presume to charge a higher price;
Since patients always pay those doctors best
Who make their calls in finest clothing dressed."

On occasion the cold steel was used by the physician himself. Arnold of Villanova, no lover of feminism, begins his third book of "Commentaries" in this way—"In this book, I propose, with God's help, to consider diseases peculiar to

women. And since women are, for the most part, poisonous creatures, I shall then proceed to treat of the bites of venomous beasts." What robust gynæcology!

THE RENAISSANCE AND THE REFORMATION

The medical practice of the fifteenth and sixteenth centuries is coloured with superstition and charlatanry. Following the teachings of Arabic medicine, diagnosis consisted almost wholly in the examination of the pulse and of the urine—methods which allowed the grossest forms of quackery. As a result, the popular conception of the physician, both in the writings and drawings of the time, is as a "urine gazer". This professional pose, tinctured with mysticism and bizarre astrological practices, was bitterly satirized, and it is evident that the popular opinion of the physician was far from flattering. In a book published by Sebastian Braut at Basel in 1494 the physician is portrayed in a woodcut with the Fool's cap and bells upon his head. In another, Thomas Murner's "Narrenbeschworung" (Strassburg, 1512) the following couplet is put into the mouth of the physician:

"Galen and Mr. Hippocrates
Have taught me that where water is
There 'tis wet.

If the patient does not die, so it will do him good."

Luther (1483-1546) despised physicians and seldom paid them. On one occasion he said, "Medicine makes sick patients, for doctors imagine diseases, as mathematics makes hypochondriacs, and theology, sinners." Erasmus called physicians "torturers and harpies". Montaigne said, "Doctors know their Galen well and their patients not at all." The level of the profession was probably never lower than during the middle ages. Thomas Gale, a military surgeon, writes in 1544, during a campaign of Henry VIII,

"There was a crowd of rascals that pretended to be surgeons. Swine—and horse-gelders, cobblers, and tinkers were all mixed together. These fine fellows, that were commonly called 'dog-leeches', accomplished such cures that their wounded never needed more than one or two bandagings, and never afterward complained of pain, cold or heat; for many such soldiers simply perished of very light wounds."

The same distressing picture of the time appears in a tract appended to a translation of Lanfranc's "Chirurgia Parva", published in 1565 by John Hall, "Chyrurgen", entitled "An Historical Expostulation against the Beastlye Abusers, both of Chyrurgerie and Physyke in Oure Tyme". The tract is directed chiefly against quacks of the day, but also includes practitioners and ignorant empirics practising urinoscopy. The author accuses ignorant surgeons of running about the country "like pedlars, tynkers, ratte-catchers and vacaboundes, some only to set bones, some to drawe teethe, some to let blood, some to cutte ruptures, and take out stones; but all thys rather (under such colour) to mayntayne an idle and thevyshe lyfe than to profyte the common whole, to the great uprobie of all the whole profession of medicine". He further reviles the "sheepe heades" that are so "myserably suffred to abuse so noble an arte". He objects to the division of medical sciences—"the pernicious division", resulting in the creation of "every smearer that listeth to abuse them".

A sixteenth century version of an old Latin epigram is as follows:

"Three faces the Physition hath;
First as an Angell he
When he is sought; next when he helps,
A God he seems to be;
And last of all, when he hath made
The sick, diseased, well
And asks his guerdon, then he seems
An oughley Fiend of Hell."

THE SEVENTEENTH CENTURY

In an age when the rational inquiry into the nature of the universe came into full blossom, when "the sonnes of Adam were as busie as ever he himself was about the Tree of Knowledge of good and evil, shaking the boughs of it, and scrambling for the fruit", the achievements of medicine were the work of a small group of individuals. The great mass of the physicians were swathed in the mists of mediæval pedantry and superstition. If one could hold the mirror up to nature it would reveal the medical man of the period, gross and fat, pompous and quarrelsome, in wig, stock, frocked coat and knee breeches, wielding the clyster and jealously guarding his drugs. The century which produced Harvey still clung to alchemy, and the physician-astrologer who let blood and purged by the signs of the Zodiac was pilloried by Butler, the arch-satirist of the age, as one who was

"For profound
And solid lying much renowned."

Physicians and apothecaries, surgeons and barbers, wrangled eternally in an atmosphere of intolerance, bitterness, profligacy and hypocrisy, while a horde of cataract healers, lithotomists, herniotomists and booth surgeons, "no better than runagates or vagabonds," wandered through the land. The physician reviled the surgeon: "booted lackeys . . . . a race of evil extravagant coxcombs who wear mustaches and flourish razors," Guy Patin termed the surgeons in a spirited controversial passage. The pedantic established physicians of the Faculties opposed the growing scientific ideas. Riolanus, of the Paris Faculty, who attacked Harvey's conception of the circulation of the blood, has won the historical laurel in modern times of being designated by the vigorous Huxley as "a tympanitic Philistine who would have been none the worse for a few sharp incisions". It is little wonder that in this age medical satire and caricature flourished.

The almost universal practice of blood-letting was savagely satirized by physician and layman. Van Helmont, though fantastic in his ideas of chemistry, reviled bleeding. "A bloody Moloch sits President in the chair of medicine," he said. And again—"Unless the Lord shall avert it, the life of mortals will dayly be shortened and at

length pass into the Grave in its green eare, through the offence of cutting of a vein and purgings." But the most famous satire on blood letting occurs in Gil Blas, by Le Sage, which, although published in 1715, in spirit belongs to the seventeenth century. It describes the adventures of Gil Blas while in the apprenticeship of the celebrated Dr. Sangrado who "had got into reputation with the public by a certain professional slang, humoured by a medical face, and some extraordinary cases more honoured by implicit faith than by scrupulous investigation". Dr. Sangrado always bled "with the utmost rigour of the law", and in treating an old canon drew off eighteen good porringers of blood, while drenching him copiously with warm water.

In this century appeared the one great antagonist of genius who has come into the lists against medicine—Molière. Five of his comedies are directed against the medical fraternity, in which he satirized the ponderous ways, the long-winded consultations, the sterile learning, and the drugging propensities of physicians. In "Le Médecin Malgré Lui" Sganarelle, playing the part of doctor, alludes to "the left side where the liver is, and the right side where the heart is". The auditor protests against this reversal of anatomy, pointing out that the heart is on the left and the liver on the right. Sganarelle replies: "Oui, cela étoit autrefois ainsi; mais nous avons changé tout cela, et nous faisons maintenant la médicine d'une méthode toute nouvelle." The greatest of his medical satires is "Le Malade Imaginaire", in which Argan, the hypochondriac, is drugging himself for scores of imaginary difficulties. In the play there is a burlesque on the medical graduation exercises of the Paris Faculty. The candidate is plied with ridiculous questions, and as he answers is greeted by the chorus in obligato: "Bene, Bene, Bene, Bene, respondere."

The wrangle between the apothecaries and the physicians is preserved in the heroic couplets of the satirical poem, "The Dispensary," by Sir Samuel Garth, the Kit Kat poet and the fashionable whig physician of his day, of whom Pope said, "If ever there was a good Christian without knowing himself to be so it was Dr. Garth." The physicians of the day were bitterly divided over the establishment of dispensaries under the College of Physicians for the supplying of drugs to the poor at cost price, and this added fuel to the quarrel which already existed between the physicians and the apothecaries. Garth bewails the medical division—

"But now no grand inquiries are descryed,
Mean faction reigns where knowledge should preside.
Feuds are increas'd, and learning laid aside."

He blisters the apothecary's assumption of medical learning:

"The patient's ears remorseless he assails,
Murders with jargon where his med'cine fails."

And of consultations:

". . . . the solemn state
Of grave physicians at a consult met:
About each symptom how they disagree
But how unanimous in case of fee."

Garth pictures the shade of Harvey lamenting the dissensions of the College of Physicians:

"How your sad sick'ning art now hangs her head,
And, once a science, is become a trade."

One of Garth's opponents in the battle of the wits of Queen Anne's time was Sir Richard Blackmore. Blackmore who had been a teacher in his younger days, like many another medical man before and since, was taunted with this fact. Coddington wrote of him:

"By nature formed, by want a pedant made,
Blackmore at first set up the whipping trade.
Next quack commenced; then fierce with pride he swore
That toothache, gripes and corns should be no more.
In vain his drugs as well as birch he tried,
His boys grew blockheads, and his patients died."

The stately prose measures of Addison on one occasion, at least, were laid against the physicians. In the Spectator papers, number 21, he writes:

"If, in the third place, we look into the profession of physic we shall find a most formidable body of men; the sight of them is enough to make a man serious, for we may lay it down as a maxim that when a nation abounds in physicians, it grows thin of people . . . . This body of men, in our own country, may be described like the British army in Caesar's time; some of them slay in chariots, and some on foot. If the infantry do less execution than the charioters it is because they cannot be carried so soon into all quarters of the town and despatch so much business in so short a time."

The cupidity of the physicians undoubtedly threw people back upon less educated surgeons, the barbers and the apothecaries. As Nicholas Culpeper, the famous herbalist, neatly put it, "Physicians of the present day are like Balaam's ass; they will not speak until they see an angel." (The fee of the licensed physician was 6s. 8d., known as an angel.)

There are scores of aphorisms, tags of rhyme, and short couplets which sound the changes on the iniquities and follies of the physician.

"He hath abandoned his physicians, madam; under whose practices he hath persecuted time with hope, and finds no other advantage in the process but only the losing of hope by time."—('All's Well that Ends Well,' Act I, Scene 1.)

Shakespeare, however, usually deals kindly with the physicians, and in the doctor in "Macbeth" he portrays a quiet, courageous, common-sense figure.

From Boileau:—

"You say without reward or fee
Your uncle cured me of a dangerous ill:
I say, he never did prescribe for me;
The proof is plain, I'm living still."

From the French:—

"Would you send the man you hate
Down to Pluto's dark dominions?
No bravoes hire to seal his fate—
Bid two physicians on him wait:
Two of different opinions."

"One doctor single, like the sculler plies,
The patient struggles, and by inches dies;
But two physicians like a pair of oars,
Waft him right swiftly to the Stygian shores."
—*Joseph Jekyll.*

Ben Jonson addresses "Doctor Empiric" in this way:—

"When men a dangerous disease did 'scape
Of old, they gave a cock to Esculape:
Let me give two, that doubly am got free—
From my disease's danger, and from thee."

The Prescription—

"Would you wish to get well without failing
Of I know not what ill, which, I know not for why,
For this fortnight has made you look feeble and ailing?
I prescribe you to buy,
How much I can't say, of a root I know not,
To mix of I know not what simples a potion;
Pound, I know not what herbs and of them make a lotion.
Which, applied piping hot,
Will for aught that I know,
Make you eat, drink and sleep as a fortnight ago:
But this I can venture for certain to say,
Half the doctors in London prescribe the same way."

Certainly the richest storehouse of medical legend and opinion of this century and preceding ages is the "Anatomy of Melancholy", published in 1621 by the quaint old bachelor don of Christ Church, Oxford, Robert Burton. This book is one of the minor classics of English literature, and with Sir Thomas Browne's "Religio Medici" shares the first place in the affection of all lovers of medical literature. The book abounds in quotation and is a vast mine of miscellaneous learning set forth with humour in the vigorous prose of the time. Burton quotes hundreds of medical epigrams and bits of satire on the physician, chiefly from the classical writers, which one can hardly lift from their context without spoiling their flavour. They are all written down with the utmost tolerance and good nature, for, says Burton, "I will urge these cavilling and contumelious arguments no farther, lest some physician should mistake me, and deny me physic when I am sick."

(To be continued)

Association Notes

A Proposal for the Control of Specialists in Canada

A meeting of the Committee on Specialists appointed at the Annual Meeting of the Canadian Medical Association in Calgary in June, 1934, was held in the Medical Building, University of Toronto, on October 23, 1934, with the following members present: Dr. E. S. Ryerson in the Chair, Drs. Primrose, FitzGerald and D. Graham, and, by courtesy, Drs. W. E. Gallie, and J. Gunn, of Winnipeg.

The chairman presented a proposal for the control of specialists in Canada which may be outlined as follows.

The Medical Council of Canada is the organized body under which should be placed the supervision of the qualification and certification of Specialists. This is an actively functioning body conducting examinations with the object of determining that a graduate in medicine is qualified to practise.

It is proposed that the Medical Council of Canada should establish and appoint boards of examiners at each of the various centres (as required) for the purpose of conducting examinations in each of the specialties; and that those practitioners who pass these specialist examinations be granted a diploma or certificate of qualification by the Medical Council of Canada.

It is proposed that before he will be eligible to write on these specialist examinations, a candidate will be required to present "an enabling certificate", which he will obtain from his own Provincial Medical Council. This certificate would state that the candidate has fulfilled certain minimum educational requirements relating to his post-graduate education and training in the particular specialty in which he desires to be examined.

It is proposed that a Specialist Diploma or Certificate be granted by the Medical Council of Canada to those practitioners who have successfully passed the specialist examinations and that a Register of qualified specialists be published by the Council.

The Medical Council of Canada would have to make certain provisions for the acceptance of qualifications that would be considered as equivalent to the fulfilment of the specialist requirements of the Dominion and Provincial Councils. The qualifications of the Royal Colleges of Great Britain or Canada, or higher university degrees might be dealt with in this manner.

The adoption of such proposals would necessitate an amendment to the Canada Medical Act, by which the Council would have additional powers in this matter.

This would result in throwing certain responsibilities on Provincial Medical Councils, on medical faculties in the Canadian universities, on the Canadian and Provincial Associations, on the medical profession in general practice, and on the members of the profession practising in the specialties.

A. Provincial Medical Councils.—Each Provincial Council would have to endorse the principles of the above proposal, agreeing to the supervision of the qualification of specialists being placed under the Medical Council of Canada. Each Council would also consider the applications of practitioners who desire to take the specialist examinations, and determine whether the applicant has fulfilled the minimum educational requirements by post-graduate study and training, and, if he has, issue an Enabling Certificate authorizing him to take the specialist examinations of the Medical Council of Canada.

The Councils might make regulations regarding the use of Specialist Certificates in their Province.

B. Medical faculties in the Canadian universities.—Facilities would have to be provided by the universities to enable practitioners to fulfill the educational requirements laid down by the Councils and to pass the specialist examinations. In order to acquire an adequate knowledge of the particular part of the scientific subjects, Anatomy, Physiology, Biochemistry, Pathology and Bacteriology, which are applicable to any special field of practice, the candidate might be provided with facilities to study any of these subjects in every one of the Canadian universities. The universities would also have to provide facilities in their hospitals for candidates

to acquire a thorough practical training and extensive clinical experience in the special fields of practice. Such facilities are only available in the larger centres of population and bigger universities, where a great number and wide variety of cases are found. Post-graduate degrees or diplomas might be established in some universities, the attainment of which would be an indication of the fulfilment of a high standard of training and education in the specialties. Universities might at some time in the future restrict appointments to positions on their staffs and to their hospitals to practitioners who hold some recognized qualification for specialists.

C. Canadian, Provincial and Local Medical Associations.—Medical Associations should endorse the principles of specialist control as proposed, and urge their members to recognize the importance of a minimum educational standard for those practising the specialties. They should educate the public to the necessity for an adequate training and education for those who desire to practise a specialty.

They should endeavour to influence Boards of Directors of the Hospitals in their district to restrict their future appointments in the special branches to those who are qualified and registered as specialists.

D. Members of the profession in general practice.—When a practitioner announces himself as a "specialist" at the present time, general practitioners have no way of knowing whether such a specialist has had adequate post-graduate training and is fully qualified to practise his specialty. The introduction of the proposed control by the Medical Council of Canada would result in the publication of a Register of Specialists in which would appear the names of those who have been certified as fulfilling certain educational standards and as passing a specialist examination. Patients and the public would become educated to ascertain whether or not a specialist is qualified to practise his specialty.

E. Specialists in practice and their associations.—Specialists should endorse the principles included in the proposal, as it is a means of maintaining a high standard of efficiency among specialists. Specialists in each of the specialties (as required) would be appointed as examiners at each of the centres where examinations are conducted. They would examine the candidates in their specialty to determine whether or not they are qualified to practise in this specialty. They should endeavour to influence Boards of Directors of the hospitals in their district to restrict their future appointments to those who are qualified and registered as specialists. They might maintain a high standard in their specialist associations by requiring that admission to membership would be dependent upon being listed in the Register for Specialists.

Royal Colleges of Physicians and Surgeons of Canada.—The introduction of the above proposal for the control of specialists should not conflict in any way with the Royal Colleges of Canada. The question is often asked "Why should not all specialists become Fellows of the Royal Colleges?" Some reasons why this should not be the method of controlling specialists are as follows: (a) Their examinations in Anatomy and Physiology are so comprehensive that the average graduate who wants to qualify as a specialist is unable to devote the time needed to prepare himself for them. (b) The content of these subjects includes their whole scope, whereas the graduate who wishes to become a specialist in a limited field, wishes to spend his time in studying anatomy, physiology, pathology, etc., in relation to the specialty he is working for. (c) The content of the subjects of the final examinations is also much broader than the limited field in which he wants to specialize, so that, in order to become an F.R.C.P. or S. (C.) he would have to study Medicine and Surgery in addition to his own specialty, and he has not the time to do this. (d) The expense of obtaining a Fellowship is greater than he would have to meet if he only had to pass one examination on his specialty by a Specialist Board of Examiners. (e) If all graduates entering Specialties became Fellows of the Royal Colleges, the value of the F.R.C.P. or S., as a distinguishing designation indicative of a very high standard of knowledge, would be materially decreased. (f) If the Medical Council of Canada were to grant a Specialist Diploma and publish a Specialists' Register, many graduates of high quality in the larger cities and at the universities would seek a higher qualification such as F.R.C.P. or S., so that they would be recognized as outstanding men and consultants in their particular field of specialism.

Control of specialists in U.S.A.—Certain Examining Boards in medical specialties are approved by the American Medical Association Council on Medical Education, provided they conform to the standards of administration formulated by the Council. The following Boards are listed in the American Medical Association Directory, but this does not imply that approval has already been granted: (1) American Board of Dermatology and Syphilology. Fees $35.00. (2) American Board of Obstetrics and Gynæcology. Fees $50.00. (3) American Board of Ophthalmology. Fees $50.00. (4) American Board of Oto-Laryngology. Fees $50.00.

All these Boards state in their requirements that an applicant must limit his practice to the particular specialty and will continue to do so. Several require that an applicant must be known personally to a member of the Board.

By such regulations no general practitioner could qualify as a specialist in any field and then continue to do general practice until he had become established in a special field. No practitioner who is qualified as an obstetrician and gynæcologist can become a member of their Association if he at the same time practises general surgery. Requiring to be known personally introduces the personal factor, regardless of whether a man is qualified to practise a specialty or not.

Great differences in standards exist between the requirements laid down by the various Boards. The recognition of a specialist by a specialist association will not have as great significance to the public or to legislative bodies as his recognition by a nationally organized Body or Council.

The protection of the public is the main reason for the present licensing system for practitioners in each of the Provinces. The determination of those who are licensed is based on the fulfilment of certain minimum educational requirements and the passing of a licensing examination, either Dominion or Provincial. In this manner, every licensed practitioner is recognized by the public and by the profession as qualified to practise. In the same manner the protection of the public is the main purpose for the introduction of some system of control of the practice of the specialties of Medicine. The suggestion is made that the determination of those who are qualified to practise the specialties should be based on the fulfilment of certain minimum educational requirements and the passing of a specialist examination under the supervision of the Medical Council of Canada.

Any attempt to have legislation introduced or regulations adopted for the purpose of preventing a general practitioner from undertaking any practice of a "Specialist" character, or a "Specialist" from doing any general practice, is fore-doomed to failure because of the impossibility of its enforcement and of the possibility of its preventing a practitioner from doing what he may deem essential for the patient and thereby denying to the patient the necessary treatment for his condition. The chief aim in licensing practitioners and in devising any system for the control of specialists is to guarantee to the patient that the practitioner or specialist he consults is qualified to undertake the type of practice which he announces to the public by his nameplate, card or letterhead.

If the protection of the public from the unqualified specialist is accepted as the basic principle in the control of specialization, then all of the arguments

justifying the protection of the public from the unqualified practitioner by the present systems of licensure can be used to justify any scheme that is devised for the control of specialists.

A practitioner of medicine entitled to call himself a "Specialist" is one (a) who has fulfilled certain minimum educational requirements in the special field of practice which he is desirous of practising, along with the attainment of a superior knowledge in the fundamental subjects (anatomy, physiology, biochemistry, pathology, etc.) which underlie diagnosis and treatment in this special branch of practice; and (b) who has successfully passed a "Specialist" examination conducted for the purpose of determining whether or not he is adequately qualified to practise in this special field of practice.

In order that the public, including the profession, may know that a practitioner who calls himself a specialist has fulfilled the above requirements and is qualified to announce himself as a specialist, there should be published a Register or List of Specialists who have fulfilled these requirements. This Register should be available for consultation by both the public and the profession. The practitioners whose names appear in this Register should be in possession of a Certificate or Diploma stating that they are qualified to practise the specialty specified. It is not considered advisable at present for Provinces to license specialists in a manner similar to the licensure of practitioners.

The Committee decided to pass on this proposal to the Executive Committee for their consideration. The report, therefore, will be considered at the meeting of the Executive next March.

Provincial Association Notes

The Manitoba Medical Association

At a meeting of the out-going and in-coming Executives of the Manitoba Medical Association, held on October 25, 1934, the matter of the revision of the by-laws of the Canadian Medical Association was discussed and a memorandum was prepared which Dr. Harvey Smith could bring before the Executive Council of the Canadian Medical Association at their next meeting on October 30th.

REPORT OF THE COMMITTEE ON THE CONSTITUTION OF THE CANADIAN MEDICAL ASSOCIATION

There is very good reason to believe that the integrity of the Canadian Medical Association has been threatened in recent years. The unanimity and cohesion that should form the backbone of a national organization seems to have become impaired. We believe that this tendency is to be deplored and feel that every effort should be made to consider it and to place the Canadian Medical Association in a strong position throughout the whole Dominion.

The reasons for this tendency to disintegration are, no doubt, complex, and possibly have an intimate relation to general economic conditions. These conditions we cannot hope to influence. We can, however, make a close scrutiny of our own organization with the hope of discovering its defects and applying appropriate corrections. After such a scrutiny, we feel that the chief defect is that the contacts of the various provincial societies with the parent body are not as intimate nor as direct as they should be.

The Executive Committee of the Canadian Medical Association has very wide powers. It can, according to the Constitution, assume all the functions of the Council. In spite of this, it has no direct contact with, or responsibility to, the various provincial bodies. Its members carry no mandate from their provinces and need not report to them. At various times, certain provinces have been entirely without representation on the Executive for several consecutive years. Such a condition must tend to produce a state of indifference or even antagonism to the activities of the Executive in the outlying provinces.

The Council, as it is planned in the Constitution, is a thoroughly representative body; in practice it is not representative. Its members, so far as the Western Provinces are concerned, are usually those who can afford the time and money to attend the annual meeting, and not necessarily those who are best qualified to represent the provinces. The Council meetings, consequently, usually contain a large number of disinterested and irresponsible onlookers.

We feel that the Canadian Medical Association should in effect be a federation of the various provincial associations, and in order to implement this plan we make the following suggestions:

1. *The Council:* The Council shall be much smaller and more representative. It might consist of two or three accredited representatives from each province. This body shall direct the general policies of the Association. It could meet several times a year. Each provincial group would be expected to report the proceedings directly to its own Executive. This Council should directly control, and be responsible for, the activities of the Executive. The expenses of the members of the Council could be met by the Canadian Medical Association and the various provincial associations. The meetings of Council could be held at various places as occasion demands. Sectional or regional meetings might also be arranged, *e.g.*, all the Maritime members of Council, together with the Secretary, President and Chairman of Council, might meet for a special reason.

Such a plan would no doubt involve a greater expense than the present plan. This outlay would, we think, be justified as a definite contribution to the consolidation of the Association. It would not be necessary that every member of Council should attend each meeting. Whether or not they should go could be determined by the various provincial executives after considering the agenda.

2. *The Executive:* The Executive should consist of a small centralized body whose function is to carry out the plans of the Council. It might be composed of the Secretary, Treasurer, and Chairman of Council, together with the President and President-Elect as *ex-officio* members.

3. *Annual General Business Meeting:* This should occupy one day before each annual meeting. This should be open to all members. Some subjects of general interest should be introduced and freely discussed.

4. *Field Secretaries:* In order to further unify, it might be well for the Canadian Medical Association to have a Field Secretary in each province. He might be a part-time Secretary, who would look after the interests of the Canadian Medical Association in the province (membership, etc.), and should be selected by the local Executive.

5. *Branches or Divisions:* The various provincial organizations might be designated as divisions of the Canadian Medical Association, and the district societies might be called branches. All proceedings of the parent body could be passed to divisions and branches.

These suggestions are intended to be remedial rather than radical. We submit them with a sincere interest in the future of the Canadian Medical Association, and with the hope for its perpetuation and strength.

W. HARVEY SMITH
F. D. MCKENTY
J. C. MCMILLAN
E. S. MOORHEAD
W. W. MUSGROVE
J. D. ADAMSON.

It was felt, however, that the whole matter was so important as to deserve fuller study, and so it was referred back to the Committee, to report back as soon as possible.

The Saskatchewan Medical Association

At a meeting of the executive of the Saskatchewan Medical Association the following Cancer Committee was appointed: Drs. E. B. Alport, C. M. Henry, D. S. Johnstone, R. C. Riley, all of Regina; Drs. W. S. Lindsay, E. E. Shepley, R. H. MacDonald, all from Saskatoon; Drs. T. M. Leask and J. E. Bloomer, of Moose Jaw. Dr. F. W. Hart, Indian Head, was re-appointed as representative of the Saskatchewan Medical Association on the Anti-tuberculosis League.

It was decided to continue to send local speakers to any District Society in the province who wished to hear them and to pay the expenses of such speakers.

The following were appointed as representatives of the Saskatchewan Medical Association on the Council of the Canadian Medical Association: Drs. H. H. Christie, Esterhazy; A. M. Young, Saskatoon; G. R. Peterson, Saskatoon; V. E. Black, Moose Jaw; Hugh MacLean, Regina; D. P. Miller, Prince Albert, and W. D. McPail, Kindersley. LILLIAN A. CHASE

Medical Societies

The Academy of Medicine, Toronto

A special meeting of the Academy of Medicine, Toronto, was held on November 16th, to hear Dame Janet Campbell, D.B.E., M.D., M.S., London, England, deliver an address on "Developments in community health work as it affects the medical profession". Dame Janet Campbell has just retired as Senior Medical Officer for Maternal and Child Welfare of the British Ministry of Health, President of the International Committee on Infant Mortality set up by the Health Committee of the League of Nations, and Chief Woman Medical Advisor to the Board of Education of Great Britain. She was in Toronto as a guest of the Canadian Council on Child and Family Welfare. Dame Janet also gave numerous addresses to representative organizations throughout the city.

On December 4th at the regular stated meeting the Academy of Medicine, Toronto, had the pleasure of entertaining Dr. Allan R. Dafoe, of Callander, Ont. He gave a fascinating account of his management of the now famous Dionne case under the caption of "A medical fairy tale". Dr. Dafoe has a very easy and unassuming manner, and his story of this unique experience was most engrossing. He related a few facts in connection with his choice of a profession and his practice in the sparsely settled Northern Ontario village, and signified his intention of continuing to work among his French Canadian patients. On entering practice, his father, evidently a fine type of general practitioner, had said to him, "Do your work well, and keep your mouth shut".

Coming to the case in point, he gave a short account of the history and scientific aspects of multiple pregnancy, and went on to relate the case history of Mrs. Dionne, aged 25, who was married at the age of 16 and the mother of six children. The pregnancy was unioval. There was one placenta with five separate cords

and five separate amniotic sacs. Unfortunately the placenta was destroyed in the general confusion, and as two of the children were born when he arrived, the sequence of the births is not known. The last two were born with the sacs intact.

The mother went into shock from hæmorrhage and he thought she was going to die. There was nobody to go for the priest, the father having disappeared, so he was obliged to travel two and a half miles and get the priest himself. On their return the mother was better and made a good recovery.

The babies were foot-printed for future identification. One gathered that the chief reason for the success in preserving the lives of these children was the very painstaking attention given to all the details of management by the doctor. It was very evident that he had not spared himself in any way.

Dr. Dafoe regaled his audience by reading a few of the many extraordinary letters he had received. Some of these giving advice for controlling Mr. Dionne, and others containing suggestions for raising the babies, were most amusing. He showed a fine group of lantern slides, one of which portrayed as he expressed it "A stork's eye view of the Dionne home". There was also a well constructed moving film showing the actual daily routine in the new hospital for the babies. In his concluding remarks he drew attention to the invaluable assistance he had received from his brother, Dr. W. A. Dafoe, of Toronto, from Dr. Alan Brown, Dr. F. Routley, of the Canadian Red Cross, and from the Ontario Government who gave much material support.

Some 230 Fellows heard Dr. Dafoe and they were a most interested and appreciative audience. The thanks of the Academy were expressed by Dr. W. A. Scott and Dr. Fred. Routley. GILBERT PARKER, *Honorary Secretary.*

The Edmonton Academy of Medicine

At the meeting held October 29, 1934, of the Edmonton Academy of Medicine Dame Janet Campbell, D.B.E., M.D., M.S., addressed the meeting on the subject of maternal welfare. She dealt especially with the problem of the maternal death rate. She also outlined various steps which were being taken in Great Britain to improve the status and training of both medical students and nurses in obstetrics.

The annual dinner was held on December 5, 1934. Mr. Justice Ewing was the guest speaker, and took as his subject the two honourable professions, Medicine and Law. He suggested that the rudiments of law might be included in the school curricula alongside of hygiene, anatomy and physiology. This would lead to a more intelligent citizenship and better respect of our laws and constitution. The speaker also touched briefly on some aspects of medico-legal practice.

The results of the elections for 1935 Executive were as follows: *President,* Dr. H. K. Groff; *First Vice-president,* Dr. Gordon Gray; *Second Vice-president,* Dr. Irving Bell; *Treasurer,* Dr. John W. Scott; *Secretary,* Dr. Leslie Williamson; *Committee,* Drs. T. W. Henry, John Mcgregor, John Oswald.

The Montreal Dermatological Society

Under the chairmanship of Prof. Albéric Marin, a meeting of the Montreal Dermatological Society was held at the Montreal General Hospital on December 1, 1934. The clinical material, some forty-seven cases in all, was exhibited by members of the hospital staffs, and a discussion of the cases was conducted.

The minutes of the previous meeting (April 14, 1934) were read and adapted. It was decided that the next meeting would be held at the Notre Dame Hospital in February.

PAUL POIRIER, *Secretary-Treasurer.*

The Montreal Physiological Society

At a meeting of this Society held on December 17, 1934, the following papers (here in abstract) were read.

A PHARMACOLOGICAL STUDY OF THE INFLUENCE OF THE AUTONOMIC NERVOUS SYSTEM ON EXPERIMENTAL CONVULSIONS INDUCED BY THUJONE ADMINISTRATION, by Haddow M. Keith and George W. Stavraky.—An account was given of the convulsions and of the accompanying manifestations which take place after intravenous administration of thujone in anæsthetized and unanæsthetized rabbits and cats. The convulsant effects of thujone when administered alone and in combination with sympatho- and parasympathomimetic drugs were compared, and the conclusions arrived at are outlined in the following summary.

1. (a) In cats under dial anæsthesia the convulsions brought about by minimal convulsant doses of thujone are preceded by a general vasodilatation, as judged by a fall in blood pressure, increase in the size of the pial arteries, and an increased blood flow through the submaxillary salivary gland, as well as by an increase in the rate and volume of the respiration. (b) Sublethal doses of thujone can produce convulsions which may be accompanied by an inhibition of the blood flow through the salivary gland and by a decrease in the size of the pial arteries. This effect seems to be more marked after a preceding intravenous administration of adrenalin. The respiratory movements are also inhibited during this convulsion and not increased, as occurs with the smaller doses of thujone.

2. Sympathetic stimulants, such as adrenalin and pitressin, and small doses of nicotine as

well as histamine, when added to the thujone, markedly increase the severity of the convulsions and lower the minimal convulsant dose of the drug itself in unanæsthetized cats and rabbits.

3. Stimulants of the parasympathetic nervous system, such as acetylcholine, acetyl b-methyl choline, and to a much less degree pilocarpine and physostigmine, when added to the thujone, tend to prevent the occurrence of convulsions. This effect of the parasympathomimetic drugs is abolished by atropine, a preceding injection of which renders the animal susceptible to convulsions in spite of the presence of acetylcholine, for example, in the thujone.

4. Nicotine and ergotamine administered in doses which depress the sympathetic nervous system prevented the occurrence of thujone convulsions in 50 per cent of the animals.

5. Atropine, scopolamine, and hyoscyamine, when administered in physiological amounts, had but little effect on thujone convulsions.

6. Other drugs reported to affect the autonomic nervous system, such as b-tetrahydronaphthylamine, ephedrin, and choline, did not alter noticeably the susceptibility of the animals to convulsions.

INTERRELATIONS BETWEEN THE PREGNANT UTERUS AND THE OVARY DURING GESTATION, by Hans Selye.—If all the embryos but one are removed from the uterus of a rat during pregnancy the corpora lutea of gestation and the mammary glands do not develop as well as normally. It seems, therefore, that development and function of the corpora lutea of gestation are not predetermined at the beginning of pregnancy but depend upon the quantity of embryonic or placental tissue in the uterus. The removal of the embryos from the pregnant uterus does not necessarily interfere with the further development of the placenta. Such placentæ exert the same influence on the ovary as the whole ovum would, that is, they inhibit the maturation of follicles and maintain the corpora lutea of gestation.

Deciduomata, that is proliferations of purely maternal placenta, can only develop in the presence of an active corpus luteum, and they retrogress as soon as the corpus luteum retrogresses. They are dependent upon the corpus luteum, but are unable to prolong its life.

The hormonal stimuli necessary for the maintenance of the corpora lutea of pregnancy, and through these for the development of the embryos, originate in the fetal placenta.

LIVER AND MUSCLE GLYCOGEN IN SYMPATHECTOMIZED CATS, by S. Dworkin. — The muscle glycogen of normal cats is in the neighbourhood of 0.8 per cent on the average. After unilateral sympathetic denervation, whether in the upper or lower limbs, the glycogen content may be significantly increased, though not always. The completely sympathectomized cat is hypersensitive to insulin, and, having gone into convulsions, seldom recovers spontaneously. Even after several convulsive seizures, however, liver and muscle glycogen is present in large amounts. It is apparent, therefore, that the increased susceptibility to insulin is not due to depleted glycogen stores.

J. S. L. BROWNE

The Saint John Medical Society

At the regular monthly meeting of the Saint John Medical Society Dr. D. W. F. Porter, of the pædiatric service of the Saint John General Hospital, presented a paper on "Cœliac disease" which dealt with the subject historically, clinically and as to methods of treatment. The attendance was large, in spite of several other counter-attractions. Dr. Porter's paper was discussed by Drs. Collins, Lunney, and W. O. McDonald.

The previous meeting of the Saint John Medical Society, which was held at the very end of October, 1934, was addressed by Dr. S. R. D. Hewitt, Superintendent of the Saint John General Hospital, in which address he outlined a scheme of group hospitalization. This matter has been referred to a special committee for study.

The Saskatoon and District Medical Society

Dr. Andrew Croll, F.R.C.S., was elected unanimously to the presidency of the Saskatoon and District Medical Society for 1935, at a meeting on December 7th. Other officers elected were: *Vice-president,* Dr. H. E. Alexander; *Secretary-treasurer,* Dr. Wallace Bond; *Executive,* Drs. H. C. Boughton, J. T. MacKay, and Finn, of Dundurn.

The Winnipeg Medical Society

The regular monthly meeting of the Winnipeg Medical Society was held in the Medical College on December 21st.

Dr. Daniel Nicolson reviewed the types of intra-oral and lip cancer treated by radium in Manitoba during 1932-33. There was an excellent discussion, and the feeling was expressed that greater publicity should be given to the favourable results that can be obtained in these cases, either by radium or surgery.

Dr. Gilbert Adamson gave an address on "Epilepsy; its etiology and treatment". He felt that in many cases epilepsy was inadequately treated, and advised that bromides, or bromides combined with phenobarbital, be given in sufficiently large doses and continued for a long time.

Dr. F. W. Jackson, Deputy Minister of Health, presented an outline of a proposed scheme of health insurance, to be carried out as an experiment in the rural municipality of Woodworth.

University Notes

The University of Manitoba

The post-graduate committee has arranged a program for a three days' intensive course in cardiovascular diseases, to begin at the close of the annual bonspiel in February. The dates will be approximately February 14th to 16th, and the course is limited to twenty.

University of Toronto

Dr. Andrew Hunter, of the University of Glasgow, has been appointed to the Chair of Pathological Chemistry at the University of Toronto, made vacant by the death of Prof. V. J. Harding.

Dr. Hunter is returning to the University after an absence of six years. He was educated in Edinburgh, Berlin and Heidelberg, and was for a time on the staff in Physiology in the University of Edinburgh and the University of Leeds. In 1908 he became Assistant Professor of Biochemistry in Cornell University and held that position for six years. He was Biochemist in the United States Public Health Service from 1914 to 1915, when he became Professor of Pathological Chemistry in the University of Toronto, a position he held for four years. In 1919, Dr. Hunter became Professor of Biochemistry in the University of Toronto, and in 1928 he left that institution to become Gardiner Professor of Physiological Chemistry in the University of Glasgow. Dr. Hunter's appointment takes effect on July 1, 1935.

Special Correspondence

The London Letter

(From our own Correspondent)

In the middle of December the House of Lords gave a second reading to a Bill for the Registration and Regulation of Osteopaths. Whether this is the last to be heard of this measure, which the Lord Chief Justice declared "staggered" him, or whether it will be duly advanced and passed as the law of the land remains to be seen. In the meanwhile the profession is formulating the correct attitude to adopt. If the public really express a demand for osteopathy and desire to see this method of treating disease put on a proper sort of basis there seems no reason for doctors to protest; it would be more logical for them to wear sackcloth and ashes, lamenting for their failure. But it would not be fair to interpret the present move as coming from the public; it is rather from the majority party of the osteopaths who seek to establish what orthodox medicine has never claimed, namely, a monopoly of one form of treatment. Indeed, since the definitions in the new Bill are so vague, it is possible that medical men may be prohibited under its terms from any type of manipulative treatment, while Lord Moynihan in his speech in the House of Lords against the second reading went further and stated that for him the only logical course, if the Bill is passed, would be to repeal the Medical Act. As a back-door to a form of medical practice the new Bill would be dangerous and against the public interest, especially as power is sought to allow osteopaths to sign certificates of death. It was this proposal which specially upset the equilibrium of the Lord Chief Justice.

In the course of the debate on the osteopaths bill the official speaker for the Ministry of Health made the suggestion that osteopaths should either seek to convince the General Medical Council of changes in the curriculum necessary to include their cult or to secure permission for registered practitioners to give anæsthetics for them. Perhaps this was said with the tongue in the cheek, or perhaps the Ministry has discussed the matter with the G. M. C. Anyone who has followed the recent history of the latter body will agree that the osteopaths have a forlorn hope. Officially the guardian of the public interests, the G. M. C. has to work in such a way that it is very easy for the lay press to interpret its actions as designed to protect only the doctor of a strictly orthodox character. Another public body has been in mild conflict with the G. M. C., namely, the British Broadcasting Corporation, and the result has been a withdrawal of the guiding resolution made in 1932. It is a little difficult for the ordinary practitioner to know now whether he ought to accept an invitation to broadcast or not. Strict anonymity is naturally insisted on, correspondence must not be forwarded, and the G. M. C. is to be supplied with the name of any medical man who broadcasts and a copy of the text of the talk. The individual doctor is left to decide for himself whether anything he may say over the wireless can possibly be construed as "advertising". So far there has been no occasion for any charge against any broadcasting doctor, but for the moment the position almost is, "Broadcast at your peril".

The British are said to have a genius for commemoration ceremonies and certainly a charming affair recently was a good example of this sort of thing. The occasion was the jubilee of the first operation for the removal of a cerebral tumour at the Hospital for Epilepsy and Paralysis, London. The surgeon was Rickman Godlee, a nephew of Lister, and the patient a young man of 25 with Jacksonian attacks. Despite the application of Listerian principles sepsis of the wound prevented a complete surgical triumph, but nevertheless, even at the time, it was felt that an epoch-making event had taken place. The commemoration lecture by Mr. Wilfred Trotter was an excellent example of the right things said in the right way, with that faint tinge of humour necessary to leaven the whole. At the com-

memoration dinner the veteran Sir James Crichton-Browne, now aged ninety-four, responded with great vigour to the toast of "The Memory of Sir Rickman Godlee" as befitted one who had been associated with the pioneer proceeding.

The health of the nation's children causes some concern to those whose daily work brings them into contact with the failures in the shape of ill patients. With the present economic situation it seems difficult to believe that malnutrition is not on the increase, but this is the general conclusion in the report for 1933 just issued by the chief medical officer of the Board of Education. The returns from the worst areas show some patches of poor nourishment, but for the country as a whole, it is insisted, the general health of the school child is reasonably good. A great plea is made on this occasion for the 70 to 80 per cent of school children who are classed as normal. By physical culture, the teaching of hygiene and the greater use and provision of open-air facilities there exist great opportunities for building up a nation of sound healthy individuals. Twenty-five years of the school medical system have laid the foundations on which a great preventive service can be built up. The report admits that not enough is being done for the healthy child. Others read into the figures that not enough is being done for the poorly-nourished ones, of whom some seventy thousand appear to exist. As a percentage of five million this is not large, but it is quite enough, and no doubt the sick children of this country are drawn from this group.

121 Harley St., London. ALAN MONCRIEFF.

The Edinburgh Letter

(From our own Correspondent)

Professor Edwin Bramwell has resigned the Moncrieff Arnott Chair of Clinical Medicine in Edinburgh University. His resignation is much regretted by the medical profession in Scotland. He has found it advisable to take this step in order to devote his energies to his private practice. Professor Bramwell is recognized as an outstanding authority on neurology, and he is greatly esteemed for his personal qualities. He has been elected President of the Section of Neurology and Psychological Medicine at the Annual Meeting of the British Medical Association, to be held in Melbourne this year. The University Court has appointed Dr. Edwin Matthew to fill the vacancy. He at present holds the position of honorary physician to the Royal Infirmary of Edinburgh. While an undergraduate at Edinburgh University he won the Ettles Scholarship, which is awarded annually to the most distinguished student of the year. He graduated M.B., Ch.B. in 1897, and took the degree of M.D. in 1908, obtaining a gold medal for his thesis.

The provision of a municipal midwifery service for such cities as Glasgow was suggested by Dr. J. M. Munro Kerr, Emeritus Professor of Midwifery at Glasgow University, in the course of an address to the Scottish Branch of the Queen's Institute of District Nursing. He said that the problem of maternity care differed in rural and urban areas, and spoke of the importance of correlating the work of the Queen's nurses with ante-natal clinics and of cooperation with doctors and specialists. Maternal mortality, he said, could not be entirely eliminated. The price must always be paid for motherhood. What could be accomplished was to bring it down to the irreducible minimum. He referred to the fact that the present maternal mortality figure was similar to that of fifty years ago, but pointed out that there was a more exact notification of the cause of death today than there was at that time, and that, while there was improvement on the one hand, there were additions on the other which resulted in a flattening out of the death rate. The chief reason for the unsatisfactory situation was because the various agencies concerned were not cooperating fully with each other. He believed that many of the deaths occurred as a result of this faulty organization. He stressed the necessity for obtaining greater cooperation from the women themselves, and stated that he saw no alternative in such a city as Glasgow to the provision of municipal midwives. In these days much public attention is being drawn to this question of maternal morbidity and mortality, and the suggestion is being made in certain quarters that for the safety of the mother and child all confinements should take place in hospitals or in maternity homes and should be attended by a specialist. On the other hand the great majority of the profession believe that it is in the public interest that the midwifery service of the country remain in the hands of the general practitioner, the pregnant woman being attended in her own home by her own family doctor. It is interesting to observe in this connection that in the report of the Glasgow District Nursing Association for last year it is stated that 939 confinements were attended in their homes without the occurrence of a single death. It is a regulation of this service that no maternity case shall be undertaken by any of the nurses unless a doctor is in attendance on the patient and conducts the case himself. When it is remembered that the great majority of these confinements took place in working-class houses under conditions by no means ideal the results are not without significance.

The British Medical Association views with grave concern the Bill for the Registration and Regulation of Osteopaths which has been read a second time in the House of Lords and which if it became law would set up a statutory board and a register similar to that kept by the General Medical Council. Lord Moynihan, in moving the rejection of the Bill, said that those who supported it had not fully perceived the implications of the Bill, nor had they foreseen the irreparable calamity that would follow if assent were given to it. The Bill set aside all the de-

fences which had been erected for the protection of the public and which time and circumstance had shown to be so necessary. Lord Dawson of Penn said the Bill really aimed at giving a short cut to a body of people who wanted to acquire the status of a doctor by it. Any back-door entrance would bring down the whole fabric of the efficiency of the healing art. "I would never hesitate," said Lord Dawson, "to ask an osteopath to assist me if I thought that this craft was particularly suited to the case. We are prepared to treat them as co-workers, but we are not going to give them equality of status with the science of medicine, for which they have had no proper training." Viscount Gage (for the Government) said that if the Bill passed the public would be asked to decide officially between what would purport to be two rival schools of medicine. What justification would the Ministry have for putting the public in that dilemma? "If we agree to this Bill," he added, "or to anything like it, we shall be countenancing diagnosis and treatment by persons who are nothing more nor less than partially qualified doctors. This is one of our fundamental objections to the Bill." The second reading was carried by 35 votes to 20, and the Bill was referred to a Select Committee. The British Medical Association has published a Memorandum on the subject, setting forth the respects in which the Bill is contrary to the public interest.

R. W. CRAIG.

7 Drumsheugh Gardens,
Edinburgh.

Topics of Current Interest

Dinitrophenol in Obesity

Since the clinical report on the use of Alpha-dinitrophenol in obesity appeared in *The Journal*,[1] interest in this product and its actions has been widespread. Unimpeded by marketing restrictions, dinitrophenol has been sold and used indiscriminately, with the inevitable serious toxic effects. Reports of its toxicity have, in fact, persuaded many physicians to suspend use and final judgment until the results of further studies should be known. That this policy has not been followed by all is amply demonstrated in the figures cited by Tainter, Cutting and Stockton[2] in their recent critical review of the subject. Thus they state that during the previous year the Stanford Clinic supplied physicians, or patients on physicians' prescriptions, with more than 1,200,000 capsules of dinitrophenol of 0.1 grm. each. Since the usual daily dose is about three such capsules and the average duration of treatment about three months, this corresponds to 4,500 patients treated with the drug in a year. They estimate that probably at least 100,000 persons have been treated with the drug in this country alone. This number appears sufficient for preliminary summarization and analysis.

Basically there are two paramount features to consider. There is no doubt that dinitrophenol can increase the tissue metabolism, probably by direct action on the cells and without producing the side actions that accompany metabolic stimulation by thyroid. The second important fact is that the margin between therapeutically tolerated doses and definitely toxic ones is often narrow. All studies of this drug must of necessity be grouped around these considerations.

At present the principal therapeutic interest of dinitrophenol lies in the loss of weight occurring in obese individuals as a result of the increased metabolism produced by this drug. When taken in adequate dosage, the increased metabolic activity burns extra fat and carbohydrate without appreciably affecting the protein as indicated by nitrogen excretion. With these facts there appears to be no serious quarrel, although opinions as to the clinical efficacy vary.

Tainter and his co-workers have considered the toxic effects from the standpoint of fatalities and from the reported lesions of the skin, liver, kidneys, circulation, blood and gastro-intestinal tract. They cite three fatal cases resulting from the therapeutic ingestion of dinitrophenol. In one of these there was a definite question as to the true cause of death, since the clinical history and the course were at variance with the known actions of the drug. In neither of the other two cases was the use of the drug confined to the usual therapeutic doses.

In a group of 113 obese persons treated by dinitrophenol, skin rashes were observed in about 7 per cent. Since these skin rashes may be unpleasant or alarming in some instances, they constitute the main disadvantage, Tainter believes, in the therapeutic use of dinitrophenol. About half of the patients who have had one skin reaction are able, however, to resume the medication later without any further difficulty. With regard to liver damage it appears that ordinarily there is no demonstrable evidence of injury of this organ from the drug. In fatal cases destructive changes may occur in the liver as well as in the other viscera, but since those reported were accompanied by high fever the latter could itself account for the morphological changes observed in the liver cells. The possibility must be left open, however, that in occasional patients an idiosyncrasy may exist which might mediate damage to the liver. Possible toxic effects on the kidney seem to be even more remote.

In considering the circulatory system Tainter and his co-authors say: "One of the most striking features of the metabolic stimulation of dinitrophenol is a lack of significant changes in the blood

1. CUTTING, W. C., MEHRTENS, H. G. AND TAINTER, M. L.: Actions and uses of dinitrophenol: promising metabolic applications, *J. Am. M. Ass.*, 1933, **101**: 193.

2. TAINTER, M. L., CUTTING, W. C. AND STOCKTON, A. B.: Use of dinitrophenol in nutritional disorders, *Am. J. Pub. Health*, 1934, **24**: 1045.

pressure or pulse rate, unless therapeutic doses are exceeded. That is, the metabolism may be increased by as much as 50 per cent without demonstrable changes in circulatory activity. . . . Patients who have hypertension can be medicated with dinitrophenol like other patients. As they lose weight the hypertension is usually improved." It is perhaps malignant neutropenia occurring during dinitrophenol medication[3] that has aroused the greatest professional alarm. Although Tainter and his co-workers have seen no cases of agranulocytosis, and have observed no other abnormalities of the blood affecting the hemoglobin or the fragility of the red cells, they feel that the possibility of agranulocytosis must be borne in mind pending further observations.

There seems to be agreement at present that dinitrophenol is a drug of potential dangers when used indiscriminately. Its sale should be restricted to that ordered by the physician's prescription, and its use by medical men should be carefully supervised. Probably it should be employed only when reduction of obesity is important and when ordinary dietary methods have failed.—*J. Am. M. Ass.*, 1934, **103:** 1950.

Osteopaths in Great Britain

There is now before the House of Lords a Bill for the registration of Osteopaths in Great Britain. Some reference to this can be found in our monthly letters from Drs. Moncrieff and Craig. We feel, however, that our readers will find interest and pleasure in reading Lord Moynihan's speech in moving the rejection of the Bill.

LORD MOYNIHAN'S SPEECH

It is to me a matter of no little regret that I feel myself compelled to oppose a Bill introduced by my noble friend Lord Elibank. I do not forget that when, a shrinking and timorous novice, I had the audacity to introduce a Bill to your Lordships' House, the fact that the Bill passed its third reading was due in part to the invaluable help and wise counsel of the noble Lord in special Committee. But, if I may be permitted to say so, I fear that the noble Viscount has not fully perceived the implications, still less foreseen the irreparable calamity that would result if your Lordships gave your assent to this measure. My objections come from two quarters.

LEGAL ASPECTS

In the first place the Bill involves a negation of all the principles already embodied in the Medical Act of 1858. Before this Bill, if passed by Parliament, could become effective this Act would surely have to be repealed. This Bill would defeat the intention and effect of the Medical Acts, which through the *Medical Register* provide a clear line of discrimination between those who have, and those who have not, passed through the recognized medical curriculum. The relevant purpose of this Act is the protection of the public from the ignorant and dangerous attentions of those who have undergone no adequate training or any training in the sciences upon which medicine is based, who know little or nothing of the normal structure of the human body by dissection, of the morbid changes appearing in disease, of the proper or disordered functions of organs, or of that multitude of scientifically discovered and scientifically tested truths upon which the clinical work of physicians and surgeons is founded. The Medical Act of 1858 is primarily an Act for the safeguarding of the public; and this Bill seeks to set aside all the carefully constructed substantial defence which time, circumstance, and opportunity have so frequently shown to be necessary, and to substitute a very frail protection and simulacrum. If by some miracle of perversity the Legislature should accept such a Bill as this, the claim now put forward would assuredly not end with osteopaths. If one particular "theory" of medicine were granted recognition contrary to the Medical Act of 1858 (Sections 23 and 28) a precedent would be created for the official recognition of any other cults which cared to include a smattering of medical subjects in the curriculum. There is nothing in the Medical Act to prevent any man, qualified or unqualified, from practising osteopathy. Many of your Lordships are far more competent than I to express a considered opinion upon this first point I raise—namely, that acceptance of this Bill would require that the Medical Act at present in force, by which, so far as legislation can secure it, the safety of the public is protected, should be repealed.

PROFESSIONAL ASPECTS

The second objection I venture to offer concerns not the legal but the professional aspect of this Bill. Its acceptance would involve a denial of, and would hold up to obloquy, the whole scientific basis of medicine. If there is one country in the world which should regard itself as the custodian, protector, and guardian of scientific medicine, it is our own; for it was in this country that modern scientific medicine had birth, and it was in this country that the greatest discoveries, foundation stones, and landmarks in the history of medicine were made. The claim may justly be made that medicine is at once parent and nurse of all science. For the methods by which all science advances are those first introduced, or in their origins most successfully applied and established, by practitioners of medicine.

The inductive method of logic was created not by Aristotle, nor by Socrates, nor by any phil-

3. HOFFMAN, A. M., BUTT, E. M. AND HICKEY, N. G.: Neutropenia following amidopyrine: preliminary report, *J. Am. M. Ass.*, 1934, **102:** 1213. BOHN, S. S.: Agranulocytic angina following ingestion of dinitrophenol, *ibid.*, 1934, **103:** 249. SILVER, S.: A new danger in dinitrophenol therapy, *ibid.*, 1934, **103:** 1058.

osopher, but by Hippocrates, of whose ancient and serious diligence Bacon reminds us: the full value and right application and appreciation of the experimental method we owe to Galen. It is by these two methods, and by these alone, that all scientific advance takes place. After Galen the methods used by him and by Hippocrates were submerged in the reign of authority which lasted for over a thousand years, a dark, sterile period in which denial of the teaching of Hippocrates was not only disloyal, but heretical, and might, and not seldom did, cost a man his life, as unhappy Servetus, discoverer of the pulmonary circulation, learnt at the guilty hands of Calvin in 1553. The first gleam of light was seen in Italy, in Salerno, oldest of her universities, and so far as medicine was concerned in the wealthier University of Bologna and in Padua, famous for great teachers.

THE FOUNDATIONS OF SCIENTIFIC MEDICINE

It was the magic of Fabricius of Padua which attracted our own William Harvey to that university, where he undertook those researches which ended in his discovery of the circulation of the blood a little over three centuries ago. That discovery is the one indestructible foundation upon which all scientific medicine is based; and Harvey was empowered to make it by bringing together once again the Hippocratic and Galenic methods of inductive inquiry, comparison, generalization, and experimental proof. But until John Hunter, the patron saint of the Royal College of Surgeons of England, created with the help of Morgagni the science of pathological anatomy little was known of those structural changes in organs which enabled men to correlate them with the symptoms of disease to which they give rise. The lot of the patient was, however, little improved, in surgical matters at least, until immortal Lister, a member of your Lordships' House, basing himself upon Pasteur (already medallist of our Royal Society) and his work on fermentation, attributed infection in wounds to the propagation of living organisms within the wound, and so made possible the immense, almost incredible, advances that have taken place not in surgery alone but in medicine also, since the recognition of the part played in general disease by focal infection. It is chiefly upon the work of Harvey, Hunter, and Lister that the science and art of medicine have been founded: three great Englishmen. That is my reason for asserting that we in this country are in special degree the custodians of scientific medicine.

OSTEOPATHY A DENIAL OF SCIENTIFIC MEDICINE

Osteopathy has not only no connection with the main stem of scientific medicine: it is a complete denial of the truth of scientific medicine. If there be any truth in the fanciful and fallacious basis of osteopathy, there is none in the true science of medicine. The two systems do not run side by side; they are not complementary or mutually supporting; they are in direct and hostile opposition. If one is true the other must be false. If osteopathy is true the foundations of scientific medicine are not well and truly laid; then scientific physiology created by Harvey, pathological anatomy as founded by John Hunter, our knowledge of its infection and its relation to disease which we owe to Pasteur and Lister, are false—even contemptible. The osteopath walks by faith and not by sight. When he speaks of the "lesion" he means something that neither chemical examination, radiological examination, nor post-mortem examination reveals to those trained in the practice of these methods. In place of knowledge gained in all the world by biologists, physiologists, pathologists, and bacteriologists we are asked to accept a cult fabricated not after arduous research, but springing up spontaneously by a process of serendipity in the mind of a layman in America, where it grew apace, though denied and derided from the day of its birth to this very moment by all scientific opinion in that country.

I do not deny that the problem presented today may contain elements of obscurity. Some of your Lordships may have heard, or even in your own persons may have experienced, a sense of benefit from treatment at the hands of an osteopath. I do not deny that such things are possible, nor do I deny that medicine has been slow to incorporate in its methods the art of those outside the fold—even, indeed, at times of those within the fold. Medicine is always slow to accept new methods, because a heavy responsibility rests upon it to ensure that, within the limits of contemporary human knowledge, only the best, well-tried, and well-proven methods shall find a place in its orthodox practice. But today it cannot be denied that orthopædic surgery embraces all the sound methods hitherto employed empirically either by bonesetter, manipulative surgeon, osteopath, or other "natural" practitioner. This we owe to the genius of my late dear friend Robert Jones, the greatest orthopædic surgeon the world has known. He was the nephew and pupil of H. O. Thomas, whose name is for ever associated with the Thomas splint, which gave such splendid service during the war. Thomas was himself the son of a bonesetter, with whom he was in partnership before the Medical Act of 1858 rendered this illegal. Thomas was indeed the descendant of generations of bonesetters who flourished in Wales and settled at last in Liverpool. All the quick-fingered skill of the bonesetter was brought into medicine by Robert Jones, and there, after trial and great improvement and more rational application, has at last found a place and haven, and robbed of those perils which to my knowledge made it (though at times apparently successful) not seldom a cause of death in the hands of the untrained and unscientific bonesetter.

MISCHIEVOUS FEATURES OF THE BILL

I do not now venture to waste your Lordships' time in detailed criticism of this Bill. If opportunity ever came I think I could make it clear to

the point of conviction, that osteopathy receives no clear definition in this Bill (for to say that what an osteopath may practise connotes the meaning of osteopathy is meaningless, and has many undesirable and even dangerous repercussions); that the Bill grants to foreign osteopaths the right to practise in this country, though the standards of other countries are sometimes grotesque; that reciprocity with other countries would almost certainly be denied; that the suggested training in medical subjects is too short to give a competence at all comparable with that of the general medical practitioner today; that if in future there is to be a medical training it must be equal for all those who are to practise medicine; that a shorter training would surely attract an inferior type of practitioner; that the Bill would create two standards of entry into the profession of healing, debasing the standard at a time when the medical profession is taking thought to exalt it; that the right to sign death certificates or to perform operations should in the public interest on no account be granted to those who have not, after passing through the recognized medical curriculum, been licensed by the General Medical Council, whose authority is conferred through the Medical Acts by Parliament; that Clause 8 (1), if strictly interpreted, would prevent the ordinary practitioner of medicine from using his own methods, which are being annexed by the osteopath; and that this clause would confer upon osteopathy a monopoly now denied to medicine.

Finally, I may point out that if osteopaths at long last are realizing that a formal medical training is essential before they may successfully practise their art, there is nothing to prevent them from passing through the present medical curriculum, and supplementing it in any way considered proper. This is the method followed by ophthalmologists, laryngologists, those who practise in public health, and others within the fold of orthodox medicine.

CONCLUSION

I do not desire to deal in anything but the most cursory manner with details of this Bill. It is to its principles that I offer most serious and most confident objection. It embodies an endeavour to destroy the Hippocratic unity of medicine, to foist upon the public, unaware of the danger, a spurious science which sets aside all the accumulated wisdom and expert practice of centuries. It seeks legislative authority for a "theory" of medicine that has in no country proved its validity, and is the derision of all competent and experienced minds.—*Brit. M. J.*, 1934, **2**: 1163.

Medico-Legal

II.

Moore and Moore v. Large*

British Columbia—Dislocation of the shoulder—Degree of skill—Physician's obligation to have x-ray taken—Obligation of patient to report lack of progress.

Some of the points in issue in the case of *Mlle. Bordier v. S.*† were also raised in *Moore and Moore v. Large*, decided by the Court of Appeals of British Columbia. The plaintiff slipped on the street in Vancouver, falling on her elbow and dislocating her shoulder. Some hours later she called in the defendant, a practising physician and surgeon, who, after a thorough examination in which he applied the usual and proper tests in cases of suspected dislocation, concluded that she was simply suffering from a severe sprain. No x-ray however was taken. The shoulder did not improve, but the defendant was not called in again, the plaintiff applying remedies of her own until some three months later when she consulted another physician. This time an x-ray was taken, as a result of which the existence of the dislocation was disclosed.

In the court below the defendant was condemned to pay damages of $1,800, the judge founding his judgment upon what he considered the negligence of the defendant in not having an x-ray picture taken. In appeal this judgment was reversed.

Two points in particular appear from the judgment of the Court of Appeals. First, is the physician in cases where a dislocation of the shoulder is suspected obliged to advise the patient to have an x-ray taken, though he is himself convinced, after having applied the usual and proper tests, that there is no dislocation? Secondly, is a patient negligent who fails to inform the doctor that she has failed to improve?

The degree of skill required of a physician is not in dispute. The skill and care required are the normal care and skill expected of the average physician in similar circumstances, not the highest possible degree of both. The physician or surgeon is not responsible simply because some other practitioner of greater skill and knowledge might have more successfully prescribed a different treatment. It might perhaps be remarked, though reference is not made to the point by the Court of Appeals, that a somewhat higher degree of skill would probably be required of the specialist who holds himself out as more skilful than the average practitioner, and from whom therefore more should be expected. All this is as applicable in civil, as in common, law jurisdictions.

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* 1933, 46 B.C. 179.

† See this *Journal*, 1935, **32**: 94.

Applying this test to the present case, the Court of Appeals held that, just as there is no legal authority for the proposition that if a physician in charge of a case is unable to diagnose the trouble he is under legal obligation so to inform the patient and to advise the calling in of a specialist, so there is no authority for the proposition that in cases of suspected dislocation of the shoulder the physician is obliged to have an x-ray taken, though he is convinced, by the use of the usual tests approved of by the profession, of the real cause of the trouble, and though there was no suggestion of unskilfulness or want of care on his part in any other respect. Said Macdonald, C.J.B.C., "It has not surely come to this that if the cause of the trouble is not apparent to the eye of the surgeon or physician he must advise an x-ray or take the consequence to his reputation and to his pocket for not having done so. Is the x-ray to be the only arbitrator in such a case and are years of study and experience to be cast aside as negligible?"

On the second point, as to the failure of the patient to report back to the doctor when she failed to improve, there is some conflict in the evidence, which perhaps makes the exact consequences of the holding from the lawyer's point of view a little uncertain. On the one hand, the defendant physician stated that he had told the patient to report to him in four or five days, since a mere sprain or bruise should be well in from seven to ten days. If, of course, she had reported her lack of progress, the defendant would have seen that the trouble was more serious than he had thought and would have investigated further. The plaintiff on the other hand denied that the doctor had ever given her any such instructions, and, further, her evidence would have conveyed the impression that the defendant was so fully satisfied with his diagnosis that no further visits on his part were necessary. Martin, J.A., who considered this point most fully, chose to believe the defendant's evidence and on this ground alone maintained his appeal. The real holding on this point may perhaps be stated as follows. If a doctor directs his patient to consult him again at some given future time, and if she fails to follow his instructions, and her failure is the cause of her future pain and expense and suffering then she and not he is responsible. It may be noted that in *Mlle. Bordier v. S.* (*loc cit.*), the doctor was held responsible, although the patient had not reported to him, because in that case the court held that her failure was not the cause of her pain and expense, since from the moment of the doctor's first treatment the damage was permanent. Macdonald, C.J.B.C., went even further than Martin, J.A., and in discussing this point, he said, "I think she ought to have advised the defendant even if she were not asked to do so. It is not the practice of medical men nowadays to continue visits unless the case clearly demands it or unless the patient requests it". It is suggested, with great respect, that, whether this is an accurate statement of the patient's responsibility in this particular case or not, it should be applied to similar cases with the greatest of care. It will surely often be found that "the case clearly demands" the continuance of the doctor's visits. (G.V.V.N.)

III.

Dame Cyr v. North American Life Assurance Company*

Quebec — Professional secrets — Quebec Medical Act (R.S.Q. 1925, c. 213 S. 60).

This was an action by the beneficiary of a life-insurance policy. The Company's defence was based on the alleged suicide of the assured and upon false representations in the application for insurance. The point of interest was the refusal by a physician, called in this connection, to answer certain questions put to him, on the ground that they had been revealed to him in confidence in his professional capacity.

The court upheld the physician's refusal, referring to section 60 of the Quebec Medical Act, to the effect that, "no physician may be compelled to declare what has been revealed to him in his professional character". Mr. Justice Trahan, in explanation of this section, said, in effect, that the prohibition was established neither in the interest of the patient who confided the secret nor of the physician who received it, but in the public interest, which was shown by the fact that it was created by a general law governing the exercise by medical men of their profession. More important, the court held that it was for the doctor to judge, in his own conscience, whether the facts revealed to him in the exercise of his profession were professional secrets which he should not disclose. Since, then, the witness had invoked professional secrecy, the court in virtue of the statute could not compel him to answer the question. (G.V.V.N.)

* 1934, 72 Que. S.C. 399.

APHORISMS FROM BACON

Read not to contradict and confute, nor to believe and take for granted, nor to find talk and discourage, but to weigh and consider.

In taking revenge a man is but even with his enemy; but in passing it over he is superior.

Vain-glorious men are the scorn of wise men, the admiration of fools, the idols of parasites, and the slaves of their own vaunts.

He that studieth revenge keepeth his own wounds green.

Abstracts from Current Literature

Medicine

The Pleural and Pulmonary Complications of Carcinoma of the Œsophagus. Keefer, C. S., *Ann. Int. Med.*, 1934, **8**: 72.

The author records 17 cases of carcinoma of the œsophagus in which pleural or pulmonary complications were the outstanding features of the disease. All the patients were men between 50 and 72 years of age. The primary lesion was located in the middle third of the œsophagus in 10, in the lower third in 5, and in the upper third in 2. Of the ten cases in the middle third, the growth in 4 perforated the trachea, and in 2 the left bronchus. The resulting symptoms were highly characteristic, and consisted of paroxysms of coughing and suffocation following the ingestion of fluid or food. Pneumonia or abscess-formation eventually occurred. In 5 cases, the lungs or pleura were the site of pneumonia, abscess, or empyema due to perforation of the œsophagus, and direct extension of the infection into these structures. Infection also followed tracheal or bronchial obstruction arising as the result of direct invasion of trachea or a bronchus by the œsophageal tumour, or as the result of their compression by lymph nodes involved by metastases. Three examples of these complications were observed. Lymph nodes with metastases may also cause perforation of the œsophagus. With the obstruction of the œsophagus in the upper third, the ingestion of food or fluid may be followed by an overflow from the œsophagus into the trachea and resulting infection.

Two conditions which may be confused with carcinoma of the œsophagus and its pulmonary complications are aneurysm of the aorta, compressing and eroding the œsophagus, and carcinoma of the lung, producing œsophageal symptoms. Two cases are given as examples of these conditions. H. GODFREY BIRD

Diagnosis and Treatment of Certain Types of Chronic Diarrhœa. Brown, P. W., *Ann. Int. Med.*, 1934, **8**: 93.

Cases of chronic diarrhœa constitute a puzzling group in regard to both diagnosis and treatment. There is a type which may be present for years without impairing the patient's health. It may be thought of as the "habit of diarrhœa", and seldom requires treatment. The most common type is that due to neurogenic or psychogenic factors. The term "colitis" is especially harmful when applied to this group. These patients should be educated in habits of living and eating, but should not be treated for colitis. "Treat the patient, not the colon". The author reviews 34 cases of "allergic" diarrhœa. If the general examination gives negative results, if the patient's weight and colour are good, and if direct or indirect evidence of allergic reactions is present, the diagnosis is suggested. Twenty of the 34 cases had had migraine, urticaria, asthma or hay fever for five years or more. Fatigue, acute intercurrent infections, or mental stress seemed to have been precipitating factors in some cases. Foods which the patients considered factors in causing their diarrhœa were milk, chocolate, clams, veal, pork, various fresh fruits and vegetables, and fats. Skin tests for sensitivity have not yet proved to be as valuable for ingested as for air-borne substances, although the number of positive reactions to foods is increased by the use of the intradermal method. Treatment consists in eliminating the offending foods from the diet and in instituting measures to improve the general physical and nervous stability. Calcium lactate, in heaping teaspoonful doses, three hours after each meal, is recommended.

Diarrhœa lasting for many years may follow such affections as a ruptured appendix, "intestinal flu", or food poisoning. These patients are definitely more disabled than those with the allergic type of diarrhœa. Treatment consists in the removal of oral foci of infection, the use of a vaccine made from culture of the stool, and attempts to improve the general health. As the result of voluntary or involuntary curtailment or omission of certain foods, a deficiency syndrome may result, with diarrhœa a prominent symptom. In a group of 20 patients, 16 were women. In the treatment of these cases, calcium, with or without parathyroid extract, was used with benefit. So also were intramuscular injections of liver extract and large doses of iron by mouth. A diet high in vitamins, high in protein, and with a minimal residue is essential. H. GODFREY BIRD

Pulmonary Tuberculosis as a Part of a Systemic Infection (Hæmatogenous Pulmonary Tuberculosis). Miller, J. A., *Ann. Int. Med.*, 1934, **8**: 243.

The primary infection with tuberculosis occurs usually in the lungs. The lesion is usually slight and unaccompanied by symptoms. It is invariably associated with a lesion in the tracheo-bronchial lymph nodes, and, together with this, is known as the "primary complex". This first infection sensitizes all the tissues of the body to the tuberculo-protein. As a rule the primary lesion quickly becomes quiescent and tends to calcify. In a considerable number of cases, after a long period of quiescence, bacilli are discharged into the blood stream, particularly from the lymph nodes. The effect produced depends on the dosage and virulence of the organisms and on the constitutional resistance and specific allergy of the tissues. In the majority of cases the number of bacilli discharged is small, the reactions are slight, and

the lesions and the symptoms produced by them are overlooked.

Hæmatogenous lung lesions are bilateral, and while they may be manifested in any portion of the lungs they are particularly prone to persist and develop in the cortical areas of the upper lobes. They tend to become fibrotic and calcified, and are usually recognized in this form by the x-ray, where there has been no history of obvious lung disease. Localized lesions frequently occur in some other organ besides the lungs, and it may be this extra-pulmonary tuberculosis that is first recognized clinically. In the lungs these lesions, not being open to the air passages, may produce no pulmonary symptoms whatever. In other cases, the first chest manifestation may be an acute pleural effusion, which is probably very frequently of hæmatogenous origin. The outcome is variable. Most frequently the lesions become intermittently active, and tend eventually to break into the air passages, causing the bronchopulmonary form of the disease, with cough, expectoration, hæmoptysis, etc. Bronchopulmonary phthisis may be also due, however, to an exogenous reinfection. Upper lobe localization is again characteristic, but is at first usually unilateral. Extrapulmonary lesions in organs not accessible to the outside rarely occur. Patients with hæmatogenous pulmonary tuberculosis should be required to report regularly for physical examination and x-ray. Every effort should be made to keep them from developing the more serious form of the disease, by keeping the nutrition good, and avoiding overexertion and stress of every sort. The treatment of bronchopulmonary phthisis, whether from endogenous or exogenous reinfection, is the prevention of bronchogenic spread by rest in bed and suitable collapse therapy.

H. GODFREY BIRD

The Blood Sedimentation Test: Its Use as a Routine, especially in Pulmonary Tuberculosis. Ringer, P. H. and Roach, M., *Ann. Int. Med.*, 1934, **8**: 258.

The authors discuss the technique of the sedimentation test, the nature of the reaction, its limitations, and give Cutler's grouping of cases according to their influence on the sedimentation rate. The test is non-specific, the rate being increased in all conditions in which rapid destruction of tissues is going on. The increased rate is thought to be due to the increased fibrinogen content of the blood plasma present under these circumstances. It is thus increased in all acute infections, in certain chronic infections, in malignancy, and in thyrotoxicosis. The test is of particular value in tuberculosis, in which in less than 1 per cent of active cases it is negative. Using Cutler's technique, the authors studied the sedimentation rate in 272 patients with tuberculosis, making 552 tests in all. No attempt was made to correct for fluctuations in the red cell count, as the majority of workers in this field have found the test clinically satisfactory and trustworthy without doing so. The test proved of real value in diagnosis, prognosis, and in following the effects of treatment. A rise in the sedimentation rate occasionally preceded hæmoptysis. The rate was found to closely parallel radiological changes and to help in the interpretation of equivocal films. Experience showed that it was inadvisable to discharge patients before the sedimentation rate returned to normal. Focal infections, such as diseased teeth, diseased tonsils and chronic sinusitis do not cause an increase in the sedimentation rate.

H. GODFREY BIRD

Hyperthyroidism due to Diffuse Hyperplasia of all Parathyroid Glands Rather than Adenoma of one. Albright, F., Bloomberg, E., Castleman, B. and Churchill, E. D., *Arch. Int. Med.*, 1934, **54**: 315.

The literature now contains over 100 cases of hyperparathyroidism proved by autopsy or operation. The authors have studied 19 cases at the Massachusetts General Hospital. The first 14 showed an adenoma of one parathyroid gland, or possibly, on rare occasions, of two. Recently however, 3 patients with clinical hyperthyroidism were found at operation to have multiple parathyroid enlargements, considered to represent hyperplasia of all parathyroid tissue. The authors believe that parathyroid hyperplasia with hyperparathyroidism is a disease entity, and is analogous to exophthalmic goitre.

Histologically, the structure of the glands in these 3 patients differed markedly from that in the 16 in whom only solitary parathyroid enlargements were present. All 3 patients failed to show involvement of the skeletal system, but entered the hospital with symptoms referable to the presence of renal stones. Removal of two enlarged glands in the first case failed to produce an effect on the serum calcium and inorganic phosphorus levels until the subsequent removal of a third enlarged gland. In the second case, two enlarged glands were found and removed, while in the third three enlarged glands, together with a biopsy section of the fourth, were removed with satisfactory results. The literature is reviewed, and evidence adduced to incriminate the pituitary gland as the cause of the hyperplasia.

LEYLAND J. ADAMS

Allergic Death. Waldbott, G. L., *Arch. Int. Med.*, 1934, **54**: 597.

Allergic deaths usually follow injections of pollen or serum, yet death from accidental absorption in some way of antigen is more than possible. The pathological changes in "thymic

death'' resemble so closely those produced by allergic shock that one is inclined to believe that the wrong label has frequently been used. The lesions of most interest and those that occur most consistently are of a bronchopneumonic nature. These occur in what is called protracted anaphylactic shock, when the patient survives the initial seizure and offers the clinical picture of bronchopneumonia, interstitial in type with dyspnœa, fever, diarrhœa, stupor, vomiting and general malaise. Examination may show moisture, patchy bronchopneumonia, consolidation or hæmorrhagic infarcts. The cases vary in severity from wheezing with shortness of breadth to complete collapse and death. There is evidence of intense sepsis in the splenic enlargement and the cloudy swelling of the liver cells. There is usually a family history of allergy. Typhoid vaccine can produce a fatal reaction. Some types of asthma are unusually severe, not responding to epinephrine, manifesting attacks of extreme prostration from one apparently minor exposure. The lung findings were as stated above. Sodium salicylate may be the ''detonator''.

Coming to the cases supposedly thymic in origin the clinical course resembles that of those types just mentioned. Cases are quoted in which milk and orange juice were the causes of a fatal reaction.

P. M. MACDONNELL

Surgery

Acute Osteomyelitis. Fraser, J., *Brit. M. J.*, 1934, **2**: 539.

The author thinks that the local focus of suppuration in the bone has certain defensive aspects which renders its too radical removal unsatisfactory. He explains the almost invariable picking out of the metaphyseal region of a long bone by the infection by pointing out that this region possesses a high concentration of reticulo-endothelial tissue, which tissue forms one of the most important defence mechanisms of the body. He feels that the local reaction in this portion of the bone is in response to the general septicæmia—that it is a measure of the intensity of the defense reactions going on. He considers the local error as having a certain potential value, by increasing resistance to the general infection, and is content to advocate an operative procedure which ensures relief of tension and as free drainage as possible without unduly disturbing the local tissue reactions.

A tourniquet is used where possible; the affected metaphysis is exposed and the periosteum elevated. The cortex of the metaphysis is perforated by a closely set series of small drill holes which may be only one-quarter inch apart. Drilling is continued along the shaft until healthy marrow is reached. This procedure allows pus and blood to exude freely from the affected area. The soft tissue wound is left wide open, and is lightly packed with a dressing soaked with acriflavine emulsion, 1-1,000, in mineral oil, with 2 per cent potassium citrate. Over this, a copious wool and gauze dressing is placed, and the limb is encased in plaster, to include the joint above and below the affected area. In two weeks the wound is examined under light anæsthesia, any obvious sepsis removed, and the dressing and plaster reapplied for six weeks, after which sequestra are removed and the wound may be usually closed by secondary suture. If the general condition is not markedly improved by the third day an antistaphylococcal immuno-blood transfusion is given, the donor having been prepared by a vaccine injection of 500 to 750 million organisms. The author has had little success with the polyvalent antistaphylococcal serum at his disposal.

Using the above technique, the author has operated on 56 cases in the past 12 years, with 13 deaths, all due to progressive septicæmia and pyæmia.

W. FORD CONNELL

Cancer of the Œsophagus. Souttar, H. S., *Brit. M. J.*, 1934, **2**: 797.

This is one of the unsolved surgical problems. The disease occurs more commonly in men. Eighty per cent of the cases occurring in males develop at or below the bifurcation of the trachea. The growth is almost always a squamous-celled epithelioma. Following the lymphatics it encircles the œsophagus, producing stenosis. Occasionally the growth remains localized, to form a fungating tumour or an ulcer. There is usually wide involvement of the œsophagus and surrounding structures. Death results from perforation into the respiratory tract or from hæmorrhage.

The first symptom is a steadily increasing dysphagia, which occasionally may be abrupt in its onset. Unaltered food may be regurgitated. Viscid mucus is secreted into the œsophagus; this may be ejected as a white froth, which is almost pathognomonic; later, this froth becomes blood-stained and foul. A growth at the lower end will produce a flatulent dyspepsia. Pain is not usually an early symptom. Hoarseness and aphonia may develop. Irritation of the upper respiratory passages produces stringy mucus and often a constant irritable cough. Wasting occurs from starvation.

Bougies are both useless and dangerous. Radioscopy and œsophagoscopy are the methods in examination of choice. X-ray examination is the better. It is simple and safe. It indicates the level of obstruction and very often the type of obstruction. By allowing barium to

enter the stomach, then placing the patient in a marked Trendelenburg position and having him swallow, the lower margin of the tumour will be clearly defined. Œsophagoscopy is undertaken to discover the character of the growth and the possibilities of treatment. The lumen of a normal œsophagus appears as a transverse slit which opens and closes with each respiratory act. Tumour infiltration stops these movements. The lumen above the stricture is dilated. Occasionally a piece may be removed for section. Treatment must aim at relieving dysphagia. This may be accomplished by dilatation, intubation, or gastrostomy. The gastrostomy should be done at an early stage. If intubation does not relieve the patient, gastrostomy should be done. Dilatation should only be attempted under direct vision. A wire guide, headed by a fine flexible bougie, is passed first. Then gradually increasing dilators are passed along the guide. Great gentleness is necessary. Relief from this lasts only a few weeks. More permanent relief is obtained by inserting a flexible tube of spiraled German silver wire having an expanded upper end. A cone-shaped glycerin suppository inserted into the lower end of the tube is of definite aid during intubation. Radiation therapy is probably the only method offering a prospect of cure.

STUART GORDON

Obstetrics and Gynæcology

Studies Relating to the Time of Human Ovulation. Kurzrok, R., Kirkman, I. J. and Creelman, M., *Am. J. Obst. & Gyn.*, 1934, **28**: 319.

Ten young women were studied for their daily prolan A (follicle-stimulating hormone) excretion over extended periods. Sudden excretion of this hormone occurred at about the middle of the menstrual cycle, and had a definite tendency to recur at about the same time in the following cycle. This sudden secretion of prolan A from the anterior pituitary is considered to be the stimulus to the ovaries to induce ovulation. Evidence is given in support of this view that ovulation follows the prolan A excretion in about twenty-four hours. It is believed that ovulation cannot occur without this stimulus of prolan A. The presence of this substance is not however *prima facie* evidence that ovulation has occurred. The time of ovulation as suggested by this method is in complete agreement with the results of all other methods used in the study of this problem. The greatest incidence of prolan A excretion was between the tenth and thirteenth days; hence the greatest incidence of ovulation was between the eleventh and fourteenth days.

One case suggests the possibility of menstruation without ovulation, and another, of ovulation without previous menstruation. Two of the patients studied became pregnant while under observation; the course of events was noted in both from menstruation through to the termination of pregnancy. Suggestive time relationships between menstruation, ovulation, fertilization, migration of the fertilized ovum, and nidation are considered. Cases 1 and 2 show the very early appearance of a positive Ascheim-Zondek test, namely on the twenty-fifth and twenty-seventh days from the onset of the last menstrual period, or two days before and one day after the expected onset of the skipped period. The sudden conversion from a positive Ascheim-Zondek test to a positive prolan A reaction at the end of pregnancy is suggestive of a multiplicity of the gonadotropic hormones from the anterior pituitary gland.

ROSS MITCHELL

Early Rupture of the Membranes in the Treatment of Eclampsia. Stroganoff, W., *J. Obst. & Gyn. Brit. Emp.*, 1934, **41**: 592.

In October, 1932, twelve lying-in hospitals in Leningrad joined in studying the problem of how to improve further the prophylactic method of treating eclampsia. Under this collective investigation the method of early rupture of the membranes in eclampsia was frequently carried out, and the results obtained were found to be even more favourable than might have been expected. By early rupture of the membranes is meant rupture when the os is closed or not larger than two inches (admitting two fingers). It is obvious that the membranes should not be ruptured if there are any contraindications, such as transverse position or presentation of the funis. The first point of note was the rapid delivery which followed rupture of the membranes. The majority of patients (74) were primiparæ, and only 12 multiparæ. The reduction in the number of fits following the rupture of membranes was quite unexpected. In 50 out of 87 cases not a single fit was observed to occur prior to delivery following rupture of membranes; out of this number 3 patients had fits subsequent to delivery. The number of fits in the other patients was fairly small.

The favourable results obtained may be explained by a number of theoretical considerations. Following the discharge of 150 to 400 c.c. of liquor amnii the uterus becomes smaller and the pressure in it is lessened; and the absorption of liquor amnii containing certain ferments and extractive substances into the mother's circulation is thus reduced. The contents of the abdominal cavity are also reduced in volume and the intra-abdominal pressure lowered, which results in the abdominal organs being better supplied with blood. The diaphragm descends lower, oxidation of the blood is improved, and all the organs of the body, and, especially those of the abdominal cavity,

come under better conditions of nutrition and respiration. The heart will work under more favourable conditions. The changes are very small but we can hardly deny their importance. The technique consists in dilating the cervical canal with Hegar's dilator up to number 18-23, and then rupturing the membranes with the finger, or more often with one blade of a volsellum, and cautiously widening the rupture so as to cause the least possible trauma. When the os admits one finger or more the use of dilators is unnecessary. The drawbacks of this method are the possibility of infection and the danger of rupture of the cervix. The possibility of infection is less than with recurring fits, and very much less than the danger accompanying Cæsarean section. The risk of the cervix being ruptured in the course of rapid delivery is not great.

ROSS MITCHELL

Pædiatrics

Osteopetrosis (Marble Bones) in an Infant. McCune, D. J. and Bradley, C., *Am. J. Dis. Child.*, 1934, **48**: 949.

Osteopetrosis, which is a rare disease, is occasionally hereditary, and shows a striking familial incidence. It is characterized by an increase in the thickness and density of the cortical and spongy portions of the entire osseous system, often associated with a myelophthisic type of anæmia, and sometimes with other features, such as multiple pathological fractures, chronic osteomyelitis, hydrocephalus, optic atrophy, and enlargement of the liver, spleen, and lymph-nodes. Sixty cases, only, have been reported up to 1932. The authors add one of their own and, at the end of their paper, refer to two others. The affection, which is known also as the Albers-Schönberg syndrome, is one of a group of combined diseases of the bone and blood-forming apparatus. Typical cases can easily be recognized, but there are some which do not seem to conform to the general scheme.

The authors conclude that there is no evidence at the present time to suggest that osteopetrosis is due to endocrine disturbance, environmental factors, dietary deficiency, or chemical poisoning. Although it is possible that there are inconstant associated changes in the calcium and phosphorus metabolism, these alterations, if present, are probably secondary manifestations of a primary disturbance in the formation of bone. The Albers-Schönberg syndrome is a true developmental disease, which consists in faulty differentiation of the primitive common forerunner of osteogenic and hæmatogenic tissue. The ultimate cause is unknown, but it seems to be a property of the parental germ plasm.

JOHN NICHOLLS

The Diabetic Child: Etiological Factors. John, H. J., *Ann. Int. Med.*, 1934, **8**: 198.

Heredity is the most important factor in the causation of diabetes in children. The longer the diabetic children live, the more diabetes is discovered in their families. On this basis, the true percentage of hereditary cases is probably about 40. Diabetes appears to be transmitted as a recessive character according to the Mendelian law. When a diabetic marries a diabetic all the children will be diabetic; in a union of a diabetic with a non-diabetic with a hereditary background, one-half of the children will be diabetic; when a non-diabetic with a hereditary background marries a non-diabetic of the same type, one-fourth of the children will be diabetic; and when a diabetic marries a normal person with no family background of diabetes, no children will be diabetic. Thus, if the birth of future diabetics is to be prevented, the other partner must not only be non-diabetic, but must have a family history free from diabetes. In a study of 19 pairs of twins, the onset of diabetes was simultaneous in three pairs, and in four pairs was within 12 weeks of each other.

Infections play a considerable part in the production of diabetes in children. There is some evidence that in all acute infections, even in normal persons, there is decreased sugar tolerance which may last for several months. In a child with a tendency to develop diabetes, it may thus be precipitated. Such children need protection at these times, and proper diet, with or without insulin, may prevent them from becoming definitely diabetic. Every child with an acute infection should have a weekly urine examination until there is ample evidence that sugar is being utilized normally. The time between the infection and the onset of diabetes is often very short, in some instances only two days, and in John's cases, 45 per cent within 60 days. The threat of diabetes is very real to the adult who is obese. John, however, in glucose tolerance tests on obese children and adults, found that the children had three times the resistance to diabetes that the adults had. Nevertheless, one should look upon an obese child with suspicion, and settle the problem regarding its carbohydrate metabolism. Hyperthyroidism in children is not a rarity. However, diabetic curves occur in juvenile hyperthyroidism only about one-quarter as frequently as they do in hyperthyroidism in adults. Only by absolutely controlling the blood sugar for long after the operation can diabetes from this source be prevented. Lues and arteriosclerosis play practically no part in the etiology of diabetes in children.

H. GODFREY BIRD

Oto-Rhino-Laryngology

Tuberculoma of the Brain associated with Ear Disease. Stewart, J. P., *J. Laryn. & Otol.*, 1934, **49**: 493.

Owing to the absence of specific signs the majority of tuberculomata of the brain are diagnosed either at operation or autopsy. They are most frequently mistaken for gliomata. A tuberculoma of the brain may occur in two ways. It may be secondary, spread by the blood stream from some primary focus, or it may be the result of a direct spread from the primary focus. It occurs most commonly in the cerebellum. Statistics from the publications of various authors show the incidence of tuberculoma of the brain to vary from 1.4 per cent to 34 per cent of all brain tumours. Including the case presented here by the author, only 7 cases of tuberculoma of the brain following a tuberculous mastoiditis and secondary to it have been reported. The author's case showed the following interesting points: a painless onset; no signs of increased intracranial pressure, as the erosion of the occipital bone had caused a release of pressure, being really a natural decompression; the labyrinth was healthy; the adenoids were tuberculous. The route of infection, as shown by pathological specimens obtained at operation, was as follows: first, tuberculosis of the adenoids, then a tuberculous extension along the Eustachian tube; next tuberculosis of the middle ear with extension to the mastoid; and finally, involvement of the brain with tuberculoma formation.

Diagnosis of this condition is always difficult unless localizing signs are present; this case for example was only diagnosed at operation. The prognosis is bad, most cases dying within a year of diagnosis. The treatment is by decompression, with removal of the diseased bone, leaving the tuberculoma intact, and ultra-violet radiation. Extirpation of the tuberculoma is not to be recommended, as a tuberculous meningitis is likely to follow within three months.

GUY H. FISK

Radiology

Radiation Therapy of Cancer of the Skin. Grier, G. W., *Am. J. Roentgenol.*, 1934, **21**: 206.

It is stated that the treatment of cancer of the skin by irradiation is the universal choice; also that the massive dosage generally produces the best results; unfiltered radiation is preferred. The article is based on approximately 1,000 private cases. The author quotes Eller's dosage as follows: 100 K.V.; 8 inches skin distance; 15-18 M.A. minutes, as representing the dosage used by the best in American dermatology. Again he quotes Evans and Leucutia as using four to seven times an erythema dose, and states that he considers their dosage to be the minimum that should be used. He believes, with Cutler, that the difference in radio-sensitivity of various types of cancer is not so great as is commonly supposed. His present technique is 100 K.V.; 5 M.A.; 10 inches skin target distance; 10 minutes exposure, the time depending on the size of the lesion. Two to four such treatments are given on alternate days. The most common cause of failure is under-dosage. Four such ten minute treatments represent a total of 5,000 to 8,000 R. These massive single doses, with resulting acute reaction, are safer than the old method of repeated small doses, as there is less danger of late reactions. Precancerous lesions should be treated in practically the same way as basal-celled carcinoma. Preliminary fulguration is sometimes of advantage.

In areas covered by clothing the resulting x-ray lesion may be difficult to heal. It may be necessary to excise it to promote healing. Massive doses given within one week, amounting to 8 to 12 times a skin erythema dose, will cause the area to slough; healing will take place in 6 to 8 weeks, leaving a pliable and usually inconspicuous scar. This method is said to produce the greatest number of cures and a minimum of recurrences.

A. STANLEY KIRKLAND

The Dangers of Roentgenoscopy and Methods of Protection against Them. Leddy, T. T., Cilley, E. I. L. and Kirklin, B. R., *Am. J. Roentgenol.*, 1934, **32**: 360.

The value of roentgenoscopy is so great that at the Mayo Clinic the gastrointestinal diagnosis rests chiefly on it. Films are made only for confirmation or record. Early workers suffered burns of hands frequently, but workers in this clinic have been remarkably free from such disasters. Carman in 1918 discarded lead rubber gloves, and since then the section officers have relied on ordinary leather gloves, street clothing and celerity in examination, rather than on lead rubber screens, aprons and gloves. Since at no time has any of the physicians who conduct roentgenoscopic examinations suffered any injury, this investigation was undertaken to find an explanation of their immunity. The work of three physicians was analyzed. Each has completed approximately 40,000 gastric examinations. Ionization and photographic systems of measurement indicate that the examiners received far in excess of the accepted tolerance dose, both in aggregate and daily. They conclude that absence of detectable injury is not proof that injury has not taken place and recommend that roentgenologists continue to observe the recommendations of the International Safety Committee.

Four factors are emphasized by the physicians in this clinic: (1) the use of the smallest possible beam; (2) celerity of examination; (3) full use of the protection offered by the barium-filled viscus; (4) absence of exposure aside from that received during roentgenoscopy.

A. STANLEY KIRKLAND

Roentgen Treatment of Cervical Adenitis. Pfahler, G. E. and Kapo, P. J., *Am. J. Roentgenol.*, 1934, **32**: 293.

The authors report 333 cases, the number of cases increasing in the last year. Chronically enlarged glands are the result of repeated focal infections, with possible secondary invasion by tubercle. The tonsils frequently harbour tubercle bacilli. General treatment is not entirely successful. Surgery leaves ragged scars, chronic sinuses, and occasionally causes flaring up of tuberculous processes elsewhere. Roentgen treatment of cervical adenitis began in 1898 and has constantly improved until it is now a highly efficient form of therapy. Prior to 1922 many such patients received 30 to 40 fractional doses. Present-day patient receive many less treatments and results have improved. Of 30 treated in the past two years, 20 are apparently free of any swelling; the remaining 10 had improved 60 to 90 per cent. The average number of treatments given in each case was four.

Resorption is usually gradual. Some begin to absorb as soon as 24 hours after the first treatment. There are no contraindications to roentgen therapy in cervical adenitis, and complications should be and are rare. Factors used are 130 KvP, 5 M.A., 40 cm. distance; 6 mm. aluminum; 50 per cent S.E.D. (300 R). The dose is repeated at intervals of two or three weeks. It is not often necessary to exceed ten treatments. The majority of patients are referred by surgeons. Treatment ordinarily does not require hospitalization. It is believed that atrophy and telangiectasis can be avoided by the present technique. Old sinuses and red scars can be treated by electro-thermic destruction, followed by radiation.

A. STANLEY KIRKLAND

Physiology and Biological Chemistry

Pulmonic Interlobular Air Passages. Macklin, C. C., *Trans. Roy. Soc. of Canada*, 1934, **28**: sec. V. (in press).

The existence of "pores" or openings in the alveolar walls of mammalian lungs has been affirmed by a number of workers and denied by others, and at the present time the question is treated as an open one by many anatomists.

Professor Macklin, in this article, records his observations on histological preparations of the lung in man and the common laboratory animals, including the dog, cat, rabbit, rat, and guinea pig. In all of these the "pores" or "vents", as he calls them, were demonstrated. Macklin prepared his material from lungs in a state of full inflation (an important condition), making use of thick sections. His preparations were studied with the blood retained in the capillaries, with the blood completely removed from the capillaries, and with the capillaries injected with coloured gelatin. His injection experiments confirmed the work of Van Allen, Lingskog, and Richter that communications existed between adjacent bronchial territories.

It is obvious that the existence of these fenestræ must somewhat alter our views as to the mechanism of respiration in the air-way terminals. With adjoining alveoli in more or less free communication by means of these pores the problem of the equalization of alveolar air pressure becomes simpler. It is possible, indeed, that these openings may guard against the over-distension of the alveoli, on the one hand, or under-distension, on the other. They would favour diffusion of air from areas of higher to those of lower pressure. In other words, they would favour the maintenance of equilibrium and tend to prevent atelectasis. Possibly, *per contra*, the existence of these fenestræ is a disadvantage. Thus, in the process of infection we have been accustomed to look upon the progress of the infective agents as along the course of the bronchi and their accompanying lymphatics. Now, however, we may visualize infection as travelling even at right angles to the direction of the bronchi through large areas of lung tissue, that is, there may be nothing but the defensive inflammatory reactions in the lung tissue to stop up these pores and so close the direct highway.

JOHN NICHOLLS

Therapeutics

A New Treatment for Various Kinds of Coma. Bauer, R., *Ann. Int. Med.*, 1934, **8**: 595.

The author enthusiastically recommends intramuscular injections of liver extract in cases of coma associated with liver or pancreatic disease, in post-operative coma, and in coma of little understood etiology. He has used it with striking success in so-called hypochloræmic coma, and it has been used with excellent results in coma associated with gastroenteritis, septicæmia, empyema of the gall bladder, hyperemesis gravidarum, post-eclampsia, extensive burns, etc. A very frequent finding in these cases is a greatly raised non-protein nitrogen content of the blood, and the patient may suffer from non-nephritic uræmia. The explanation for the curative effect of injections of liver extract in non-nephritic uræmia is not clear. When nucleo-proteids are broken down

by the liver, pyrimidins are formed as intermediate products. Pyrimidins contain the same nucleus as depressants such as veronal, amytal and luminal. When proteins are being broken down in excess the organism becomes flooded with these substances, and if for any reason the liver cannot break down the pyrimidin nucleus further, "autonarcosis" is likely to occur. The sudden dramatic improvement due to liver extract injection may well be explained by the assumption that the narcotizing substances are further broken down as the result of increased fermentative liver action, due, possibly, to hormones contained in the extract.

H. GODFREY BIRD

Yeast or Vitamin B_2 as "Extrinsic Factor" in Treatment of Pernicious Anæmia. Lassen, H. C. A. and Lassen, H. K., *Am. J. M. Sc.*, 1934, **188**: 461.

The authors have challenged the observations of Castle that the extrinsic factor which reacts with an intrinsic factor in gastric juice to prevent pernicious anæmia is identical with vitamin B_2 or contained in the vitamin B complex. Eight patients with typical pernicious anæmia were treated with various yeast preparations, given, partly, without additions of any kind, and, partly, after incubation with normal gastric juice. The yeast preparations employed were assayed by tests on rats as to their content of vitamin B_1 and B_2. Their conclusions are that yeast appears to be either completely without any antianæmic effect, or it contains at best minimal amounts of antianæmic factor. The additions of normal gastric juice did not increase the content of active antianæmic principle. They further suggest that any antianæmic value of ordinary yeast preparations as "Vegex" and "Marmite", as observed by Wills and others may be due to spontaneous remissions of the disease or produced as a result of autolysis of the preparation.

E. S. MILLS

Rapid Hyposensitization. Waldbott, G. L. and Ascher, M. S., *J. Allergy*, 1934, **6**: 93.

This paper deals with the practicability of using frequently repeated doses of antigen in the treatment of pollen asthma and hay fever. The therapeutic results of such treatment are not discussed because most of the patients in this series were hospitalized, a procedure which of itself frequently influences asthma and hay fever favourably. Twenty-five cases of pollen asthma and hay fever are reported, in which injections were given at the rate of three to six a day. Treatment was completed as a rule in six days. The initial dose was small enough to produce only little local œdema, and each increase was cautiously gauged by the appearance of local œdema on the site of the preceding injection. When there was swelling of any marked extent, no attempt was made to force the dose upward. No increase above 50 per cent of the previous injection was made. Eleven generalized reactions were encountered in eight cases. Eight of these reactions were delayed from 6 to 18 hours. Three of the delayed reactions were of marked severity.

"For practical purposes there may be indications for this method in severe asthmatic individuals where multiple sensitivity exists, particularly if the patient can be hospitalized."

T. G. HEATON

Pathology and Experimental Medicine

The Elementary Bodies of Zoster and their Serological Relationships to those of Varicella. Amies, C. R., *Brit. J. Exper. Pathol.*, 1934, **15**: 314.

Zoster is included among the virus diseases mainly because no causal organism can be found either in the skin lesions or in the central nervous system. Additional evidence in favour of this view is afforded by the work of Kundratitz (1925) who claimed to have transmitted the disease to normal children by inoculating them with zoster vesicle fluid known to be bacteriologically sterile. The acidophile intranuclear inclusions found in zoster lesions also suggest a virus cause by analogy with the similar inclusions that form so characteristic a feature of the cytology of some of the diseases that are now known to be caused by filterable viruses. The solution of the problem is rendered more difficult by the fact that so far zoster has not been transmitted to experimental animals. Paschen, in 1933, made an important advance when he found elementary bodies in suitably stained films of the fluid from zoster vesicles, and noted that these bodies were agglutinated when the zoster vesicle fluid was mixed with the serum of convalescent varicella patients.

Amies has studied 32 typical cases of zoster. In each of 20, seen in the early stage, he detected the elementary bodies. One patient was a child who had been in contact with a case of varicella. In this patient and in 2 others, more noticeably, the eruptions were widespread and discrete, though unilateral. His conclusions are: (1) elementary bodies morphologically similar to those found in varicella and vaccinia are constantly present in the vesicle fluid of zoster; (2) pure suspensions of these bodies are specifically agglutinated by the sera of patients convalescent from zoster; (3) attempts to demonstrate the relationship of zoster and varicella by means of cross-agglutination tests have met with a fair measure of success.

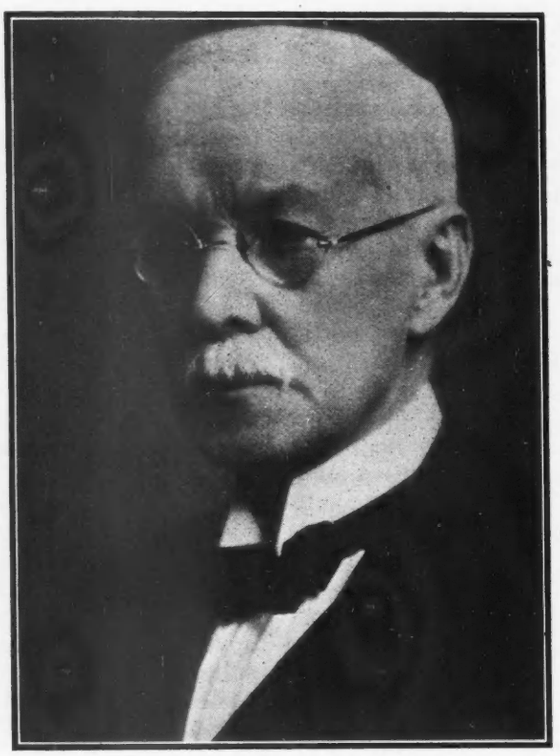
JOHN NICHOLLS

Obituaries

Dr. Alexander McPhedran, of Toronto, the distinguished physician and teacher, died suddenly at his residence on December 19, 1934.

Dr. McPhedran was born in Halton County, Ont., December 10, 1847. He was educated in the public schools and the University of Toronto, graduating in medicine in 1876. For many years he was lecturer in clinical medicine at the University of Toronto and at the time of his death was Emeritus Professor of Medicine. He was widely known throughout Canada.

Dr. McPhedran's great abilities were recognized by the medical profession in Canada and the United States and he was frequently called into consultation by his colleagues. He was a member of the American Association of Physicians, had been chief of the medical services at Toronto General Hospital, had been Dean of the Ontario Medical College for Women, a former president of the Canadian Medical Association (1907), was a consultant of the Sick Children's Hospital, and a former president of the Academy of Medicine. He was a delegate to the International Medical Congress at Budapest, Hungary, in 1909, when he was presented to the Austrian Royal Court, and, the following year, he was a delegate to the British Medical Association Meeting in England. During his long career he was a great advocate of the movement for the reform of inebriates. He was a senator of the University of Toronto, the author of several medical works, among them "Tuberculosis and the Home", and had frequently contributed articles to Canadian, British and United States medical publications. The sections in the Cyclopædia of Practical Medicine on the Liver, Spleen, Pancreas and Pleura were from his pen, and also the article on Diseases of the Bronchi and Pericardium in Osler's Modern Medicine.



Alexander McPhedran

His wife, formerly Miss Jean Adam, predeceased him eight years ago. Surviving are two sons, Dr. Fletcher McPhedran and Maurice McPhedran; one daughter, Mrs. Lois Fraser; and a nephew, Dr. Harris McPhedran.

APPRECIATIONS

The life and times of Alexander McPhedran mark a notable period of the teaching of Medicine in Canada. He was the great clinical teacher among a group of extraordinary teachers in the medical schools of Canada. These were men of character, their lives nicely balanced between idealism and practical life; materialism and commercialism played no part in their field of work. They were strong in their beliefs as to science, practice and teaching, but, valuing truth and fact, could accept new facts and remodel their views on a sound foundation of basic principles. All, whether in the fundamental sciences or in practice, taught these basic principles, insisting on acuteness of observation and recognition of facts. Encouraging a healthy imagination and stimulating sane conceptions, they taught practical medicine, training the students at the bedside to observe and to analyze the course of disease as observed and as told by the patient.

Alexander McPhedran was the outstanding exponent of these methods of teaching. His presence told of a working intellect. The clear, piercing eye intent on the patient and the reacting or unreacting student, the concise wording of logical sequence, the dramatic gestures, and the insistent questions "Why?" "How?" "Where?" were impressive, never to be forgotten, and often the outstanding memory when faced by emergencies and difficulties. Impatient of "bluff", neglect, or vagueness, he was intent on making minds work, often to the great discomfort of the student. But, when the mind finally worked and interest was apparent, the piercing eye became kindly and the voice softened. But subsequent slackness had short shrift. It was in his home this kindliness was ever to the front and the born teacher was quiet.

During his active life, the Medical Faculty was handicapped by defective organization and lack of funds, but he lived to see a promising realization of those visions which, born teacher though he was, he had so great a difficulty in making clear to most of his colleagues. Even then he was jealous for his ideals in teaching medicine, fearing that in prosperity the bedside might be neglected and that apparatus and test be raised from their proper place of improving conceptions to displace the trained eye and mind. The late Dr. H. S. Hutchison compressed into one couplet the life history of this great teacher:—

THE LEADER

A vision, and its achievement
Through daunting jealous years,
Then the burden of moulding others
To the pattern of pioneers.

An influence, and its measure
Not to be gauged in the prime,
Like mother-love enduring
Throughout its children's time.

WILLIAM GOLDIE

With the death of Alexander McPhedran an important figure in Canadian medicine passes from the scene. Living to an advanced age as he did, a man survives his contemporaries and many of his students, and comes to be somewhat of a legendary figure among the younger members of the profession. The University of Toronto owes much to him, for he was one of the group largely responsible for the success of the Medical Faculty after its re-establishment.

My first contact with him came in a summer session class. In those days we had to take one summer session course, which was entirely clinical. It was my good fortune to be assigned to his class in physical diagnosis, which was our first contact with clinical medicine. It was a fortunate introduction for the students in his group, for he was the best teacher of medicine for undergraduates with whom I ever came in contact, and I have seen and heard many of them. It was not possible to be in a class under him and not learn. He used the Socratic method very largely and insisted on clear thinking and definite answers. He was never content until he was sure that every student in the section had grasped the point he was trying to convey. He had a very keen clinical sense and the ability to pick out the essentials in the problem which was being considered. That was one of my early impressions of him in student days, and with it went the curiosity as to how he did it, a question which constantly arises in studying the methods of an outstanding clinician.

Those of us who studied medicine at Toronto University in the "nineties" were fortunate in our teachers of medicine. James E. Graham and Alexander McPhedran were in a sense complementary to each other. Their methods of teaching and their approach to the solution of clinical problems were very different, and we had the advantage of seeing this difference, with its lesson that a destination may be reached by different roads. I doubt if in the early nineties medicine was better taught anywhere on the continent, and in this McGill and Toronto shared the honours equally. Certainly those of us who went elsewhere and had the chance to measure our training in medicine against that of men from other schools never needed to be ashamed of it.

As I write, certain scenes come back. One is of my section in medicine with Dr. McPhedran in ward 5 in the old Toronto General Hospital, around the bed of a patient with an abdominal aneurysm. I could repeat much of what was said. The same applies to amphitheatre clinics. The lessons driven home have never been forgotten. He did not make the mistake of trying to cover too much ground at one time, but the points brought out were always clear.

In the study of his patients Dr. McPhedran was most thorough and there was no hurrying through the examination. He was a skilled diagnostician, and his treatment was simple and based on common sense. Therapeutic vagaries did not meet with any approval from him. Some house officers thought that he was too exacting and expected too much from them. He gave of his own best and expected others to do likewise. I look back to the period spent as his house officer as most profitable, for he would go to endless trouble to help his assistant if the man showed a desire to learn. There is no denying that the slacker had no mercy from him. Dr. Charles O'Reilly, the Superintendent of the Toronto General Hospital, used to say that he knew that a man was a good house officer if he pleased Dr. McPhedran, as his service was the most severe test.

He was not an easy man to know, and in those days carried an air of reserve which covered a kind heart. Years afterwards I learned of his kindness to students who were in difficulties; they were helped with strict injunctions as to silence. In later years, like most of us, he mellowed considerably. As a member of the Association of American Physicians, he was very faithful in his attendance, and formed friendships with many of the American members, particularly among the younger men. At every meeting there were certain of them who always arranged to have an evening of talk with him. I doubt if any one from Canada of his generation made more impression on the younger men than he did. His term as President of the Association came with me as Secretary, and I well remember how he handled a situation which might have become most unpleasant, but the man concerned (not a member) made the mistake of trying to bulldoze Dr. McPhedran; he soon realized his error.

There are many graduates of Toronto University who owe much to him for their knowledge of medicine. If they put his lessons into practice, they are carrying on with common sense and efficiency. To my thinking, Alexander McPhedran was a man who kept to the stern path of duty, with no thought as to whether he was popular or not. For sham and pretence he had the greatest contempt, and did not hesitate to show it. Toronto University has every reason to treasure his memory as one of her faithful graduates who gave his best efforts in her service. For his students his death means the cutting of another tie with former days. *Ave atque vale.*

THOMAS MCCRAE

Dr. Geoffrey Boyd, of Toronto, died at the Wellesley Hospital, Toronto, on December 23, 1934, in his 67th year as the result of cardiac failure following an operation for intestinal obstruction.

Dr. Boyd was the son of the late Sir John Boyd, Chancellor of the Law Society of Upper Canada. He was educated at Upper Canada College, Trinity College, Port Hope, and the University of Toronto. He graduated from the University with the degree of Bachelor of Arts, winning the Silver Medal in Natural Science. He then entered Medicine, graduating in 1891. Following general practice for a few years he took up otolaryngology, frequently attended foreign clinics, and was assistant for some time to the late Professor G. R. McDonough.

Dr. Boyd was a painstaking and skilful surgeon. These qualifications, coupled with an innate modesty and charming manner, soon led to the acquisition of a large practice. He was respected and admired alike by his patients and by his fellow practitioners. Always a gentleman, and an outstanding consultant, his opinions were formed by close analysis. As an operator no case was too desperate for him to match his skill against impending incapacity or dissolution on the part of the patient. He was not a prolific writer, nor was he a verbose speaker at medical meetings. His reputation was built almost entirely on his knowledge and skill as a surgeon.

For some years Dr. Boyd was Surgeon in Charge of the Otolaryngological Department of the Hospital for Sick Children, and at the time of his death he was Active Consultant on the Staff of the same institution. During the years 1913 to 1918 he was Associate Professor of Otolaryngology in the University of Toronto.

During the absence of a confrère on war service overseas some of his patients fell into Dr. Boyd's hands, and of these he kept a complete list with histories and accounts attached. He insisted on handing these over to his confrère on his return. This was characteristic of him—honest and fair dealing. He was a member of the York Club, the Royal Canadian Yacht Club, and the York Downs Golf Club.

Dr. Boyd will be greatly missed by the profession and by his patients who had such confidence in his kindly interest.

He leaves a widow, Ethel Farnsworth; one son, John Alexander Boyd, of Toronto; and two daughters, Mrs. Hugh Kindersley and Mrs. J. E. Dunning, both of London, England.

GILBERT ROYCE

Dr. Eugène Gaspard Courteau, of St-Jacques, Que., died on December 28, 1934, at the age of 67 years. He was a graduate of Laval University, Montreal, in 1894.

Dr. Joseph Telesphore Dussault, of St-David, Que., died on January 1, 1935, at the Hôtel-Dieu, Quebec. He was in his sixty-seventh year. He was a graduate of Laval University, Quebec, in 1894.

Dr. James Archibald Hamilton died suddenly at his home in Winnipeg on December 27, 1934, at the age of 65.

Born at Scarborough, Ont., in 1869, Dr. Hamilton came west with his parents in 1883 and settled at Saska-

toon. Seven years later the family moved to Winnipeg where Dr. Hamilton completed his education and graduated from Manitoba Medical College in 1894. Later he went into partnership with his brother Dr. T. Glen Hamilton, who is his only surviving relative.

Dr. Hamilton was a keen golfer and was a member of several fraternal orders.

Dr. Gerhard Hiebert died on Christmas Day, 1934, in the Winnipeg General Hospital. He was born in Russia on September 13, 1868, and at the age of eight came with his parents to Minnesota, moving to Manitoba in 1889. He graduated M.D., C.M. from McGill in 1900, and then took several years' post-graduate work in Berlin and Vienna. Returning to Winnipeg, Dr. Hiebert engaged in private practice for several years and in 1905 gave his attention almost solely to surgery. In that year he became a member of the Honorary Attending Staff of the Winnipeg General Hospital, and from 1915 to 1917 was senior surgeon. In 1919 he became consulting surgeon to the hospital. For fourteen years he was a Lecturer on Clinical Surgery on the Faculty of Medicine, University of Manitoba. He was well known to the Mennonite residents of Manitoba and took a great interest in the recently established Concordia Mennonite Hospital of Winnipeg. He became F.A.C.S. Dr. Hiebert is survived by his widow and three daughters. A man of much kindliness of heart, and with a fine education and much technical ability, he played a useful part in his profession, and his death is much regretted.

ROSS MITCHELL

Dr. Andronique Lafond, of Parisville, Que., died on January 8, 1935, at the Hôtel-Dieu, Quebec, at the age of sixty. Ten years ago he became a physician under the Provincial Department of Health, and, latterly, was in charge of the placing in better environment the children of tuberculous parents. Dr. Lafond conducted his classical studies at the Little Seminary, Quebec, and was a graduate in Medicine of Laval University, Quebec (1908).

Dr. George Henry McGuffin, of Cooksville, Ont., was among those killed in the railway collision at Dundas, Ont., on December 25, 1934.

Dr. Lorne DeCorsia McIntosh, of Hartland, N.B., died on December 11, 1934. He had driven to Woodstock, and on his way home was seized with a fatal illness before he had time to completely stop his car, which came to rest on the Hartland Bridge. Dr. McIntosh was born in Dundas, Ont., 57 years ago and had practised in Hartland for twenty-nine years. He was a graduate of McGill University (1904). For some years he was connected with the hospital at Fort Fairfield, Maine. He served during the Great War in France, Greece, Salonica and Egypt. He was president of the local branch of the Canadian Legion B.E.S.L.

Dr. Alexander Dunbar McKelvey. In the passing of Doctor McKelvey, the medical profession of the Province of Ontario loses one of its most prominent nose and throat surgeons.

Doctor McKelvey was born in Brussels, the son of Dr. Alexander and Catherine McKelvey. He received his preliminary education in Brussels, and studied medicine at the University of Toronto. Alex., as he was known to his friends and associates, took a very active part in university life. After graduating in 1908, he spent one year as house physician in the Toronto General Hospital. Deciding to confine his medical practice to the treatment of ear, nose and throat diseases, he proceeded to Boston, where he spent three years as intern in the Massachusetts Eye and Ear Infirmary. From Boston he went to the Old Country, and spent six months in visiting the clinics in Germany, Austria, France and England. He began practice in Toronto in 1913, where, through his ability and courage, he became an outstanding nose and throat specialist.

Doctor McKelvey was a great lover of sports, although prevented by an injury, received in his early days, from taking an active part in athletics. His kindness and generosity with those with whom he came in contact made him a host of friends, who mourn his passing.

He is survived by his widow, formerly Miss Margaret Kent; three children, Barry, Peggy and Kent; and one sister, Mrs. Frederick T. Bryans. VICTOR MCCORMACK

Dr. William Arthur Meighen, of Perth, Ont., died on December 27, 1934, after a paralytic stroke.

Dr. Meighen, who was born in Perth 63 years ago, received his early education there. Later he attended McGill University, and after graduating in 1901 returned to his home town to practise. In his younger days he took a keen and active interest in all athletics, particularly hockey and bicycling.

Dr. Meighen was Lanark County jail surgeon and also Medical Officer of Health for the townships of Drummond and Bathurst. In religion he was a Presbyterian.

Surviving are his widow, who was Miss Dora Benson, daughter of the late Rev. Dr. Manley Benson, pastor of Asbury Methodist Church, Perth; one son, Benson, of Perth; and one daughter, Miss Nora, R.N., Toronto.

Dr. Oscar E. Morehouse died at the Victoria Public Hospital in Fredericton, N.B., on January 1, 1935. He was 77 years old and had spent his entire life at Upper Keswick, York County. Dr. Morehouse was a graduate of McGill (1889). For the last nine years he had been District Medical Health Officer and six months ago had retired on leave of absence. Dr. Morehouse served in several capacities in municipal and provincial affairs, having been elected to the legislative assembly in 1912 and 1917. He was an ardent fisherman and had been president of the York Sunbury Fish and Game Protective Association. Dr. Oscar Morehouse of Montreal is a son.

Dr. Robert St-Jacques, of Montreal, died on January 9, 1935. He had practised in Montreal for about eighteen years, but previously had been in Centre Falls, R.I. He was in his fifty-second year.

Dr. Henry Perkins Stockwell, of Stanstead, Que., died on December 29, 1934. Doctor Stockwell was a true son of the Eastern Townships. Born in Danville on September 13, 1875, he received his education at the Danville Academy and the St. Francis College, Richmond, before undertaking the study of medicine at McGill University. A member of the graduating class of 1898, Dr. Stockwell was house surgeon at the Royal Victoria Hospital, Montreal, for eighteen months, before beginning his practice in Derby Line in 1901. After taking a post-graduate course in New York, Dr. Stockwell returned to Stanstead in 1904, and has been a resident of this place ever since. In 1911 he joined the Army Medical Corps and was attached to the 26th Dragoons as medical officer, with rank of captain.

Although Dr. Stockwell did not enter the municipal field, he contributed much towards the welfare of the community he served as a physician. He was for some years a School Commissioner and physician for Stanstead College and the Ursuline Convent, a trustee of the Haskell Memorial Library, and a prominent Mason.

Doctor Stockwell is survived by his widow, formerly Miss Mabel A. Miller and five sons: Henry Perkins, Ottawa; Herman Goodhue, Montreal; Ivan Miller, Buckingham; Walter Chipman and William Gordon, students at McGill University.

Dr. James L. Turnbull of Vancouver, aged 77, died on December 26, 1934. He was born on a farm near Milverton, Ont., graduating in medicine from the University of Toronto (1889) and Victoria University (1889). He came to Vancouver in 1907.

News Items

Alberta

At the recent elections for the Council of the College of Physicians and Surgeons, Province of Alberta, the following Councillors were re-elected: District No. 2, Lethbridge, Dr. W. S. Galbraith, Lethbridge; District No. 4, Camrose, Dr. W. V. Lamb, Camrose; District No. 6, Calgary, Dr. R. B. Francis, Calgary.

The Department of Health of the Province of Alberta reports that the adoption of diphtheria toxoid as a generally used anti-diphtheria inoculation in Alberta has during the past ten years resulted in a greatly reduced mortality rate among the people. From 1924, when 100 deaths were reported in 758 cases of diphtheria, in a population of over 700,000, making a rate of 17 per 100,000, the mortality has been reduced to less than one to 100,000 cases. In 1933 there were only 32 cases in the province with 6 deaths.

At a recent meeting of the Council of the College of Physicians and Surgeons with the Workmen's Compensation Board it was agreed that the discount of 10 per cent off all physicians' accounts over $5.00 would cease after January 1, 1935. Some minor changes were made in the fees and a new schedule will be issued shortly. The mileage fee is set at 20 cents per mile for each mile travelled, together with a detention fee for lost time, at the rate of $3.00 per hour, in addition to the fee for the service rendered. In minor cases the fee for subsequent dressings remains at $2.00 per dressing in the office and $1.50 per dressing in the hospital, but during the first two weeks the amount per week for such dressings must not exceed $10.00 per week, and after that period be at the rate of $5.00 per week. Excision of joints, knee, ankle, elbow, including subsequent visits, $75.00; radical cure of hydrocele, $40.00; fracture of the femur, $100.00; fracture of the fibula, $20.00; fracture of the patella, $30.00; fracture of the nasal bones, $10.00; incomplete fractures, one-half regular fees; open operation for bone-graft, wiring or plating, additional to flat fee (when ordered by the Board), $50.00; compound fractures not infected, additional 20 per cent; compound fractures infected, subsequent dressing fees (in hospital $1.50 each) not to exceed 100 per cent of the original fee.

It is possible that at the February session of the Legislature an enabling Act will be passed, to make provision for testing the Health Insurance Plan in one rural and one urban area. Recently the Council of the College of Physicians and Surgeons met the Government to discuss the matter. The Council offered co-operation in making the test, provided certain requisites were embodied in the plan. Everybody in the test areas should be included. Districts should be chosen which would include contributors, partial contributors, and non-contributors, so that the results of the tests might properly indicate what results could be expected were the scheme province-wide in its adaptation. Of course, the free choice of physician, with payment for the actual necessary services rendered and salaried physicians only where they were absolutely needed, and where without a salary they could not carry on. The rates of salaries and fees to be agreed upon and to be fair and reasonable, so that the practice of medicine in Alberta would be as attractive as elsewhere, so that good men would be induced to remain in the province.

Provision should be made for all types of services, such as specialist and all the diagnostic aids and scientific forms of treatment for the benefit of all the people in the test areas.

The Council agreed that at the present time, the Medical Council of Canada should not undertake to issue Specialist's Certificates. G. E. LEARMONTH

Mr. Donald Wilson, son of Dr. W. A. Wilson, of Edmonton, was elected as the 1934 Alberta Rhodes Scholar. He is the first medical undergraduate to be awarded this Scholarship by the Alberta Selection Committee.

British Columbia

The annual summer school meeting of the Vancouver Medical Association will be held from June 18th to 21st, and the hope has been expressed that some members of the British Medical Association may be able to attend, breaking their journey across Canada to Australia. This summer school has been organized annually since 1921, and has attracted some of the leading practitioners in Canada and the United States. One or more speakers would be cordially welcomed, and any additional expense thus incurred would be taken into consideration by the organizing committee. The secretary of the Summer School Committee is Dr. J. E. Walker, the Vancouver Medical Association, 203, Medical-Dental Building, Vancouver, British Columbia.

Manitoba

At the regular clinical luncheon held at the Winnipeg General Hospital presentations were made to Dr. B. J. Brandson and Dr. T. Glen Hamilton on their retirement as active members of the Honorary Staff. Dr. Brandson received an old Sheffield plate coffee tray with engraved inscription, and Dr. Hamilton, a genuine leather zipper ring book with presentation inscription in gold and leather index.

ROSS MITCHELL

New Brunswick

Dr. A. E. Logie, for many years one of the senior physicians of the Saint John General Hospital, has retired.

The District Board of Health, Saint John, reports a new low death rate from tuberculosis for the year 1934 of 73 per 100,000. A mortality rate of 70 per 1,000 live births is a new low record in the infant death rate. It also reports a definite decrease in diphtheria, directly traceable to the immunization clinics in the area.

Dr. W. E. Rowley is showing satisfactory progress following his severe illness of the last couple of months. It is expected that he will be able to go south for the remainder of the winter very shortly.

Dr. R. A. H. Mackeen, Provincial Pathologist, has been appointed examiner in Pathology for the Dominion Medical Council.

Dr. H. A. Farris was re-elected President of the Anti-Tuberculosis Association of Saint John.

A. STANLEY KIRKLAND

Nova Scotia

Dr. F. E. Lawlor, Medical Superintendent of the Nova Scotia Hospital, will retire shortly, after a thirty-five years' association with the institution. A short time ago a picture of Dr. Lawlor, donated by the Nurses' Social Club, was unveiled at the hospital by the Honourable Mr. Justice Hugh Ross, Chairman of the Board of Commissioners.

Dr. A. F. Miller, Superintendent of the Kentville Sanatorium was the guest of honour at a banquet on January 3rd, attended by members of the medical profession, patients, former patients, and representatives of the Provincial Department of Health, on the occasion of completing twenty-five years of service. A tribute was also paid by the Canadian Medical Association to the services Dr. Miller had rendered. During the evening a presentation of silver from the staff and patients was made to Dr. Miller by Mr. A. C. Milner, Chairman of the Sanatorium Patients' Committee. Numerous messages of congratulation were read at the banquet from other bodies.

Under the will of the late O. E. Smith many institutions in Halifax will benefit. The estate is valued at more than one and one-half million dollars. The institutions receiving the largest sums are: the Children's Hospital, 20 per cent; Dalhousie University, of which he was a member of the Board of Governors, 15 per cent; Dalhousie Public Health Clinic and the Grace Maternity Hospital, 5 per cent each. Smaller bequests were made to charitable and religious institutions. The late Mr. Smith had been a generous contributor to the Children's Hospital during the many years he was associated with it.

Dr. John McGourley, one of the oldest graduates of the Halifax Medical College, passed away recently. He graduated in the early "eighties" and had been engaged in practice at Sheet Harbour for more than forty years. For a time he was in charge of a pulp and paper plant in Newfoundland.

Dr. Gilchrist, a well known medical missionary from Africa, will deliver an illustrated lecture shortly at the School for the Blind. Dr. Gilchrist has been engaged in the medical missionary field in West Africa for several years. N. B. DREYER

Ontario

Professor Duncan Graham, of the University of Toronto, was the guest speaker at the thirty-fifth annual medical school banquet at the University of Western Ontario in December.

Doctor Ingersoll Olmsted was honoured by his confrères in Hamilton on the evening of December 12th by being made a life member of the Hamilton Academy of Medicine. Doctor Olmsted graduated in 1878 and has been an outstanding surgeon in Hamilton throughout his professional life. He is the first to receive this honour from the Academy.

Ontario's first rural health unit, embracing the counties of Stormont, Glengarry, Prescott and Russell, will be formed immediately in the eastern section of the province. A grant of $33,000 from the Rockefeller Foundation, to be spread over the next five years, has been made and a full-time staff will be appointed to develop a health unit under the permissive legislation passed at the 1933 session of the provincial legislature. It is expected that at the end of the five-year period, the counties in the unit and the government will jointly assume full responsibility, both administrative and financial. The Honourable Doctor Faulkner, Minister of Health, believes that the reduction in cost with respect to preventable illness will more than balance the expenditure for the maintenance of the unit. It will form an interesting experimental public health study in a group of counties with a population of approximately 90,000.

Dr. G. S. Jeffrey, Assistant Physician at the Queen Alexandra Sanatorium, London, has been appointed Medical Superintendent of the new sanatorium now under construction at Fort William. J. H. ELLIOTT

Notice of the appointment of the following Ontario coroners is contained in the *Ontario Gazette*: Dr. C. W. Bennett, Kingston, Frontenac County; Dr. H. Alexander Elliott, Toronto, associate coroner for Toronto and a coroner in York County; Dr. William Gibson, Kingston, Frontenac County; Dr. Eli Franklin Irwin, Weston, York County; Dr. Presley Archer McLeod, Kingston, Frontenac County; Dr. Gordon Wright Mylks, Junior, Kingston, Frontenac County; Dr. John Lee Poirer, St. Catharines, Lincoln County; Dr. Charles W. Sinclair, Aylmer, Elgin County; Dr. W. Douglas Thomas, Bobcaygeon, Victoria County; Dr. Ernest George Turnbull, Barrie, Simcoe County; Dr. Francis George Wallbridge, Belleville, Hastings County; Dr. John Parr Wilson, Richmond Hill, York County; Dr. Arthur Edward Harbeson, Kingston, Frontenac County.

Quebec

In January, 1934, the Editorial Board of the *British Journal of Anæsthesia* offered a prize of fifteen pound for the best essay submitted to them on any subject directly concerning the physiology or practice of anæsthetics. The prize was open to any man or woman with a qualification within the British Empire. The essays were to be not less than two nor more than six thousand words, and to have reached the Editor before August 31, 1934. On December 22, 1934, the Judges' award went to Drs. Wesley Bourne and Bernard B. Raginsky, Department of Pharmacology, McGill University. The title of their essay is: "Vinyl Ether (Vinethene) Anæsthesia in Dogs: The Effects upon Normal and Impaired Liver". It appears in the January, 1935, number of the *British Journal of Anæsthesia.*

General

American College of Surgeons.—A Sectional Meeting of the American College of Surgeons, embracing Manitoba, Wisconsin, North Dakota, South Dakota, and Minnesota, is to be held in St. Paul on March 15th, 16th, and 17th. On the program will be men of national reputation, some coming from long distances. The clinics will be held in the mornings and scientific papers and movies in the afternoon and evenings. The entire program is open to all members in good standing of County Medical Societies and all state and provincial districts. We desire to extend a cordial welcome to all medical men to attend, whether they are members of the College or not.

Dr. George Earl, Chairman, Local Arrangements Committee, 1700 University Avenue, Saint Paul, Minn.

International Medical Post-graduate Courses in Berlin.—The following international medical post-graduate courses have been arranged from March to May, 1935, by the Berlin Academy for Medical Post-Graduate Training, under the Auspices of the Mayor of the City of Berlin, and in sucession to the Society of Lecturers for Medical Post-graduate Training in Berlin:

1. Internal Medicine, with special consideration of gastro-intestinal ailments (from March 4th to March 9th). Fee: 40 RM.

2. Disturbances of Metabolism and of the Glands of Internal Secretion (from March 11th to March 16th). Fee: 40 RM.

(Courses 1 and 2 scheduled together, fee: 60 RM.)

3. Practical Progress in Roentgen Diagnosis and X-ray Therapy, particularly of Internal Ailments (from March 18th to March 24th). Fee: 70 RM.

4. Special course in Urology (from March 25th to March 30th). Fee: 70 RM.

5. Occupation and Sickness, with special Consideration of Expert Opinion (from April 1st to April 8th). Fee: 40 RM.

6. Special Course for Surgeons (from April 29th to May 4). Fee: 70 RM.

7. Special courses in all branches of medicine, with bedside and laboratory practice, are held every month. The fee is 50-80 RM. for 8 lessons of 2 hours each. In these courses special attention is paid to practical work; theory plays a minor part.

Programs and further particulars are obtainable from the Berlin Academy for Medical Post-Graduate Training, Berlin, NW 7, Robert Koch Platz 7 (Kaiserin Friedrich-Haus). German as well as foreign doctors can attend the courses.

Foreign physicians and German physicians who live abroad receive a 25 per cent reduction of fare on the German railways (Reichsbahn). By using the so-called "registered marks" a foreign physician can make his sojourn considerably cheaper. It is advisable for him to get in touch with his home bank before departing for the trip.

Fourth International Hospital Congress in Rome.—The International Hospital Association announces that the Fourth International Hospital Congress will be held in Rome from the 5th to the 12th of May, 1935. The Italian Government is making the necessary arrangements in collaboration with the chairman of the International Hospital Association. Participation in this Congress is earnestly recommended to all Public Health Departments and to all Associations, Institutions, and individuals interested in the architecture, technical equipment or administration of hospitals.

The Congress will be opened on Sunday morning, May 5th, and several papers of different aspects will be presented for discussion by leading experts on each of the following subjects: (1) The Hospital as a Link in a Systematic Public Health Service; (2) The Equipment and Technical Appliances of the Hospital; (3) The Function and Protection of the Hospital in Times of National Calamity; (4) The Importance of each Main Group of Hospital Staff with regard to the Relations of the Hospital to the Community. The afternoon of the 5th, the whole of the 6th and 10th days of May will be reserved for meetings of the permanent international study committees. A detailed program of these is being published in the first number of *Nosokomeion* for 1935.

The Congress will be preceded by a study trip through the larger cities of north Italy, and followed by a study or pleasure trip through south Italy, Sicily and Tripoli. A detailed program of the Congress, including particulars of these trips, will be published in *Nosokomeion*.

All particulars regarding the Congress can be obtained by writing to the Bureau of the International Hospital Association (Address: Dr. G. von Deschwanden, Cantonal Hospital, Lucerne, Switzerland).

The Vienna General Hospital.—The 150th year of the Vienna General Hospitals will be celebrated this year. On May 18th the Chancellor will unveil a memorial to the first director of these institutions—Johann Peter Frank—and Professor Wagner-Jauregg will deliver the official address. From May 13th to 25th will be held a series of medical celebrations, festivities, and meetings of societies. In the mornings there will be the sessions of the fifty-fifth international post-graduate course of the Vienna Medical Faculty, and in the afternoons speeches will be given by the leading members of the profession in that city and elsewhere. In the afternoons also there will be visits to places of medical interest in the city and its environs. A medico-historical exhibition will be on view in the Natural History Museum, where there will be displayed illustrations of the growth in medical technique and the development of the great pharmaceutical industry, giving some conception of the range of the discoveries that have been made. The evenings will be given over to banquets, receptions, and performances in the State theatres. Detailed information can now be obtained free from the offices of the Vienna Medical Faculty, Alserstrasse 4, Vienna IX.

Book Reviews

The Internal Parasites of Domestic Animals. A Manual for Veterinary Surgeons. Thomas W. M. Cameron, T.D., M.A., Ph.D., D.Sc., M.R.C.V.S., Research Professor of Parasitology, McGill University, and Director of the Institute of Parasitology, MacDonald College, Canada. 292 pages, illustrated. Price $4.50. A. & C. Black, London; Macmillan Co., Toronto, 1934.

This book is written with the modest desire of being useful to the veterinary practitioner and student, but even a cursory glance over its pages leaves a definite impression that it could be studied with advantage by students of zoology and medicine. The subject matter has been selected to deal only with "species of known economic importance or of common occurrence" and the reader is referred to other works for further information. This is facilitated by a list of selected references, where it is easy to find what is wanted, since the subjects are classified and the subdivisions are emphasized by bold type.

The book is divided into seven parts: Introduction to Parasitology; The Protozoa; The Helminths; Immunity and Serology; Therapeutics of Helminthic Infections; Technique; Host Lists, Bibliography and Index.

The introduction deals briefly and clearly with the biological significance of parasitism, the relations between host and parasite according to the nature and purpose of the stages of the life cycle, the adaptation exhibited by parasites, and a general view of the economic importance of parasitism. It then deals with the principles of taxonomy and the advantages and disadvantages of the way in which the rules of the code have been applied, and terminates with a series of interesting and instructive historical notes.

The part dealing with the Protozoa is brief, and probably on the grounds of "known economic importance" two-thirds of it deals with trypanosomes and piroplasms; even so, certain of these seem to be dismissed more summarily than they deserve, while there is little to indicate how much is still controversial.

The section on Helminths, occupying nearly half of the book, leaves little to be desired other than a wish that this subject had been expanded, even at the expense of the Protozoa, to include species not connected with domestic animals. The statement in the introduction that "In new countries, new parasites are becoming adapted to new hosts at the same time as old parasites are becoming adapted to a new environment", raised a hope of this and of a full discussion of the question of "reservoir hosts" and of "abnormal hosts". It is quite probable that this criticism arises out of a desire for more because of the attractiveness of what there is. The excellence of the arrangement and the clarity of exposition is assisted by the remarkable illustrations which have been specially prepared for this work, and it is a relief not to see the old time-worn plates. Especially ingenious and instructive are the diagramatic representations of life cycles, site of localization and habitat; these are not merely schematic but each stage of the parasite is an anatomical line drawing by means of which it could

be recognized. Only one error has been noticed in the illustrations; in figure 119 the names attached to J and L should be reversed.

The section on "Immunity and Serology" indicates how much there is yet to know before this chapter can be written. Several of Professor Cameron's generalizations would not be universally acceptable; his summary of what is thought and known, however, may well stimulate further investigations, which desirable end would have been helped by the inclusion of a few specific references to the literature.

The two final chapters are of a practical nature and deal respectively with therapeutics, confined to Helminths, and technique; the latter is simplified, commendably, to be of assistance to clinicians, "especially those out of touch with well-equipped laboratories" but to whom accurate diagnosis is none the less important.

Professor Cameron is to be congratulated and thanked for this well-written and eminently readable, instructive book. It deserves, and, no doubt, will get a good reception.

A Textbook of Bacteriology with a Section on Pathogenic Protozoa. Hans Zinsser, M.D., Professor of Bacteriology and Immunology, Harvard University Medical School, and Stanhope Bayne-Jones, M.D., Professor of Bacteriology, Yale University Medical School. Seventh edition. 1226 pages, illustrated. Price $8.00. D. Appleton-Century Co., New York and London, 1934.

This text-book in previous editions displayed a standard of high excellence. The new edition improves this standard. Section I gives a clear outline of the history and scope of bacteriology in a concise form. It is not an easy matter to set forth within the limitations of a text-book the important factors pertaining to infection and immunity, but the authors have succeeded in presenting an excellent outline of the subject suitable to the student's needs. The authors have also not hesitated in making the changes long necessary to text-books on bacteriology, that is, to bring the description of the microörganism in closer association with the specific disease. The new form adds interest to the volume and makes it of more practical value to the graduate as well as the student.

Veterinary Helminthology and Entomology. H. O. Mönnig, B.A., Dr.Phil., B.V.Sc., Professor of Parasitology, Faculty of Veterinary Science, University of Pretoria. 402 pages, illustrated. Price $9.00. Baillière, Tindall & Cox, London; Macmillan Co., Toronto, 1934.

Increasing attention is being paid in many parts of the world to the parasites of animals, not only because of their own intrinsic importance but because of the fact that most of the human parasites are shared with the lower animals. It is the more surprising accordingly that so few text-books covering this subject are available in English. We therefore welcome the publication of this manual on the diseases of domesticated animals caused by helminth and arthropod parasites.

After two short preliminary chapters dealing with the general principles of parasitism and with technique, the author proceeds to discuss the commoner parasites of all the domesticated mammals and birds, and the common fur and laboratory mammals—a total of 34 hosts. Each worm parasite and its life cycle, where known, is described briefly, followed by sections on pathogenicity, symptoms, diagnosis, treatment and prophylaxis. In this part, Dr. Mönnig has followed the morphological and biological portions of Baylis' "Manual of Helminthology, Medical and Veterinary" fairly closely. He differs from it however, by accentuating the medico-veterinary aspects of the subject.

The entomological part commences with a general discussion on arthropod morphology, and continues with a consideration of insects, ticks and mites as parasites and transmitters of disease. This portion is entirely new, and presents for the first time a concise account of the subject from the veterinary point of view.

The volume concludes with comprehensive host and general indexes.

It is somewhat unfortunate that the scope of the book was not extended to include the important protozoal parasites, but, as the author says in his preface, it is intended primarily for the veterinary student and practioner, and in most veterinary colleges the metazoan parasites are taught separately from the protozoa. There are 263 excellent figures, many original, dealing chiefly with morphology and intended to assist in diagnosis. None deal with pathology and few with life-histories. These, however, are minor criticisms. The book is well-produced and bound, is a valuable contribution to our systematic knowledge of veterinary parasitology, and should be of great value in providing concise, accurate knowledge on the metazoan parasites of those animals in most intimate association with man.

Laboratory Manual of Biological Chemistry. Otto Folin, M.D., Prof. of Biological Chemistry, Harvard University. Fifth edition, 368 pages. Price $3.00. D. Appleton-Century Co., New York, 1934.

This book is too well known to require much comment. It is now in its fifth edition. Originally, the book was meant by the author for the teaching of his medical students at Harvard University. Since then, however, it has served a much wider purpose. Aside from a systematic laboratory course for the training of students in the principles of biological chemistry, it now contains a variety of tests which are used routinely in clinical studies; practically one-half of the book is devoted to standard diagnostic procedures—blood and urine. The majority of methods described were developed by the author or in his laboratory, and have now stood the test of years of experience. The remainder were selected from the many available, and have also stood the test of experience. For teachers of biological chemistry, particular attention is drawn to the simplicity and conciseness with which the difficult subject of hydrogen-ion concentration may be presented to beginners. To the hospital laboratory worker, the Supplement should serve a very useful purpose.

As this book is primarily a manual, there is little space for discussion of principles of tests and technical difficulties. A number of references to the literature, however, serve this purpose. The technician will find the work very useful, since in the description of tests no important details have been left out; very little is left to the imagination of the worker.

Essentials of Histology. Sir E. Sharpey-Schafer, F.R.S., formerly Prof. of Physiology, University of Edinburgh. Thirteenth edition, 618 pages, illustrated. Price $5.00. Lea & Febiger, Philadelphia, 1934.

Schafer's "Essentials of Histology" is most certainly known to every teacher of histology in British universities, and is likewise familiar to every histologist on the North American Continent.

The new edition reveals the fact that the method of approach to the subject has remained practically unchanged for nearly fifty years, although much of the material has been re-written. For instance, the chapters on the development of blood and of bone have been re-written and brought up to date with new figures and plates. Most of the illustrations are excellent, particularly the new photomicrographs, but, for teaching purposes there should be a few photographs or drawings of reconstructed models to give the student the idea of three dimensions in his work.

The author, a physiologist, writes a purely morphological treatise on histology and, as Professor of Physiology and Histology, was able to combine the two courses in such a way that histology was not a "dead subject". In most of the medical schools of the United States and Canada, the subject of histology is

taught by the department of anatomy or as a separate department, but neither the anatomist nor the histologist is content to teach his subject without reference to functional significance. Therefore, this text-book is not likely to be so useful for teaching purposes in America as it will be in schools where the subjects of histology and physiology are more or less combined.

Textbook of Histology. E. V. Cowdry, Prof. of Cytology, Washington University. 503 pages, illustrated. Price $5.50. Lea & Febiger, Philadelphia, 1934.

Many teachers of histology believe that their science has reached a stage at which the interpretation of the wealth of material obtained by traditional methods of investigation must be reviewed from the point of view of the functioning of living cells and tissues. Such a shift of emphasis would undoubtedly show great opportunities in this science for the advancement of medical and general biology and for bridging the gaps among their various subdivisions. A striking attempt has been made in this direction by Professor Cowdry. Most of the somewhat stereotyped discussions of basic classifications (epithelia, etc.) are either swept away, or introduced incidentally, if pertinent to a particular topic. Instead of the usual arrangement of subjects, the various systems and tissues are grouped from the aspect of the functional requirements of the fully integrated body. In the detailed treatment structure has, of course, been used as a basis, but the central theme, the significance of these structures in a living body, has been carefully preserved. Much of what could be tedious detailed description has been concisely presented in the tables that are such an outstanding feature of the book. Controversial subjects are freely introduced, but confusion is avoided by the lucid analysis of the points at issue, and references to key papers are plentifully supplied. For the text figures illustrations of structures easily seen by the student have not been included, and the available space is utilized for the presentation of figures showing the more unusual aspects of histological investigation.

To teachers of histology this new book is essential, to enable them to determine the value and potentialities of its new and stimulating method of treatment. However, it can also be unhesitatingly recommended to practitioners and workers in any medical science who wish to gain a comprehensive and up-to-date view of modern work and ideas in normal human histology. They will find here an interestingly written book, and will avoid the laboured dissertations on traditional concepts that would prove tedious to such a reader.

Applied Physiology. Samson Wright, M.D., F.R.C.P., John Astor Professor of Physiology, University of London. Fifth edition, 604 pages, illustrated. Price $5.00. Oxford University Press, London; McAinsh & Co., Toronto, 1934.

This book has been very thoroughly revised and brought up to date. It is unnecessary to point out to those familiar with physiological text-books how satisfactorily it fills its place as a succinct, authoritative, source for physiological teaching. Its material is, of course, selected with a view to the application of physiology.

Practical Talks on Heart Disease. George L. Carlisle, M.D., Assoc. Prof. of Clinical Medicine, Baylor University, Dallas, Texas. 153 pages. Price $2.00. C. C. Thomas, Springfield and Baltimore, 1934.

As the author states, this book was written specially for the general practitioner in an attempt to clarify the atmosphere for him on a subject with which he must deal almost every day, for with information ascertained at the bedside and without special instruments he can adequately diagnose and treat 90 per cent of abnormal hearts. The title of the book is well-chosen, the subject being systematically covered in a series of informal talks between the author and the reader. The book contains many practical hints gleaned from a long experience, putting the subject of heart disease more on a basis of observation and common sense than on a technical or skilled knowledge of special instruments and laboratory procedures. The voluminous literature on heart disease today is likely to cloud the issue for many. So for the busy practitioner who desires the clinical acumen to treat the vast majority of his heart cases successfully in a sound and practical way the book is well worth careful perusal.

Epidemic Myalgia: Bornholm Disease. Ejnar Sylvest, M.D. 155 pages. Price $2.50 (paper). Oxford University Press, London; McAinsh & Co., Toronto, 1934.

Dr. Sylvest's monograph, which appeared in the Danish literature under the title "Den Bornholmske Syge—Myalgia epidemica", deals with a disease which is apparently prevalent throughout the world, though it has received scant if any recognition as a disease entity even in Denmark. The author, who is a general practitioner without hospital or laboratory facilities, became interested in the disease in August, 1930, as a result of observations made during an epidemic of the disease in fishing villages on Bornholm, a Danish island in the Baltic. The disease had previously been observed in Denmark, first in 1897, in Ireland in 1856, in Norway in 1872, in United States in 1888, and in England in 1924. In these countries it has been described under various headings as epidemic pleurodynia, epidemic pleurisy, myositis epidemica, Devil's grip, etc. The first half of the monograph is a discussion of the occurrence and clinical features of the disease as described outside of Denmark; the second half of the book is a survey of the clinical features of the disease as tabulated by the author during the Danish epidemics.

The volume is a fine tribute to the clinical acumen of a general practitioner. It is deserving of a place among pioneer Medical Monographs.

BOOKS RECEIVED

Synopsis of Genitourinary Diseases. Austin I. Dodson, M.D., F.A.C.S., Professor of Genitourinary Surgery, Medical College of Virginia, Richmond. 275 pages, illustrated. Price $3.00. O. V. Mosby, St. Louis; McAinsh & Co., Toronto, 1934.

Practical Physiology of the Sense Organs. R. J. Lythgoe, M.A., M.D., D.Sc., Reader in Physiology of Sense Organs, University of London. 30 pages. Price 35c. (paper). Oxford University Press, London; McAinsh & Co., Toronto, 1934.

Diseases of the Skin. S. Ernest Dore, M.A., M.D., F.R.C.P., Consulting Physician for Diseases of Skin, St. Thomas's Hospital, and J. L. Franklin, M.A., M.D., M.R.C.P., Assistant Physician for Diseases of Skin, Westminster Hospital. 410 pages, illustrated. Price $5.00. D. Appleton-Century Co., New York, 1934.

Definite Diagnosis in General Practice. W. L. Kitchens, M.D. 1000 pages. Price $11.50. W. B. Saunders, London and Phila., McAinsh & Co., Toronto, 1934.

Institutional Care of Mental Patients in the United States. J. M. Grimes, M.D. 138 pages. Price $3.00. Published by the author, 1816 North Clark Street, Chicago, 1934.

Materia Medica for Nurses. A. Muir Crawford, M.D., F.R.F.P.S.G., Professor of Materia Medica and Therapeutics, St. Mungo's College, Glasgow. Third edition, 100 pages. Price 3/6 net. H. K. Lewis, London, 1934.